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J. Robert Ippolito, director of the Central Management Information Center, receives an award from Milton J. Shapp, governor of Pennsylvania, for his work in saving thousands of data tapes at the state's computer center during the floods of Tropical Storm Agnes last June.

For Flood Recovery

Governor Commends Crew

HARRISBURG, Pa. – The director of this state's computer center was recently awarded for his role in saving thousands of data storage tapes when the center was hit by severe floods from Tropical Storm Agnes last June [CW, June 6].

J. Robert Ippolito, director of the Central Management Information Center, received the award from the governor for "economic and cost conscious achievement."

"I am pleased to single out Ippolito and the members of his staff for their work, judgment and foresight during the flooding crisis," the governor said.

(Continued on Page 4)

Telex Witness Claims Software Locks Users to IBM Processors

By E. Drake Lundell Jr.
Of the CW Staff

TULSA, Okla. – Computer users become wedded to their suppliers because of the huge programming investment and the incompatibility problems of changing from one vendor to another, a user witness told the court here last week as Telex neared the end of its presentation in its $1.2 billion antitrust action against IBM.

James Martin, DP manager at the First National Bank of Louisville, Ky., testified that software compatibility ties users into the central processors of one manufacturer, especially after making substantial software development expenditures.

Court documents show IBM studied profits and discounts of its fixed price leasing plan. See story on page 31.

In other action in the case, Telex witnesses relied almost solely on internal IBM documents to try to prove that IBM had tried to bankrupt companies in the plug-compatible marketplace and to prove once again IBM's dominance in the market.

Martin indicated his bank had a "considerable investment" in programs written for IBM processors and that it would have to make a "very large expenditure" to switch to another company's mainframes.

Translators Work But . . .

Even though many of the other manufacturers talk of translators for converting programs written for IBM machines to their systems, Martin noted these only work for part of the program and the remainder would cause the user problems.

Because of this, the user would have to get a "tremendous" savings from the other equipment, he said, in order to justify making any change.

In addition, Martin testified the only real competition had been in the plug-compatible area since that was the only major non-IBM equipment his bank had considered since going to the 360/370.

(Continued on Page 2)

Apollo, Iceberg, Midas... The Future IBM Disks?

By E. Drake Lundell Jr.
Of the CW Staff

TULSA, Okla. – In order to try to clarify some of the confusion over the code names used for various products in the IBM court documents, *Computerworld* has sorted out the documents and projected IBM future products in the disk area.

Here is the present line-up:

The IBM Merlin file referred to in many of the documents has become the 3330 which was introduced in 1970 with a capacity of 100M byte/drive and a data transfer rate of 800 kbit/sec.

There are presently two improvements being made to the 3330-type drive: Iceberg and Midas.

Midas, which is expected to be announced at any time, is a 50M-byte file or half-capacity 3330, and involves no change in technology over the 3330, according to IBM source court documents introduced here.

The half-capacity on the Midas file will be achieved by reducing the number of disks per pack and a new pack type will be created and marketed by IBM for this device, it is understood.

The device is intended for the small, medium and intermediate systems markets and the primary users will be small 155s, 145s and the larger 135s.

However, the decision to push the Winchester type drive, which has been announced as the 3340 direct access storage facility, may delay the introduction of Midas since they

(Continued on Page 2)

Secure and Accurate?

Most Vote Officials Seem Content

CW West Coast Bureau

LOS ANGELES – Although there have been many stories about inaccuracies and security breaches in computerized vote counting systems, most county election officials seem to be unconcerned about the problem.

At least that is the conclusion drawn from a survey of county election systems prepared a year ago and just released by Systems Research Inc. here.

The survey also found that in spite of claims of reducing costs of elections, punched card voting systems were actually more expensive to operate than lever-type voting systems, even though both systems were found to be cheaper to operate than paper ballots.

In the security and accuracy area, county election officials using punched card systems rated their equipment as 100% accurate and secure, the report said, compared to paper ballots which received only an 83% "good" rating in the accuracy category and only a 75% "good" rating in the security area.

Faith in Machines

"It is interesting to note the apparent lack of impact of the fairly recent controversy surrounding security of computerized vote counting systems," the report noted. "Officials apparently still find it easier to place their faith in a machine and its faceless operators than in a wholly flesh-and-blood vote tabulator," the report added.

The survey also found "none of the hostility anticipated with the advent of the punched card is reported by the election officials," noting that 82% of the officials said public acceptance of the systems had been good.

At the same time, however, the survey found the lever-type voting machines had a better public acceptance with voters, with a 95% good rating.

While 100% of the users were giving the computer-based vote counting systems good ratings in the categories of accuracy and security, only 88% rated their speed as good, with the remainder giving them only a fair rating.

(Continued on Page 5)

On the Inside

Prove Need to Upgrade: GAO

By Don Leavitt
Of the CW Staff

SAN FRANCISCO – Installations can no longer justify requests for new computers solely on the basis of an economic analysis, and "the simple fact that present equipment is in use 24 hours a day, seven days a week" isn't enough justification either, a computer systems analyst for the General Accounting Office (GAO) warned here last week.

Keynoting a meeting devoted heavily to computer performance evaluation (CPE) tools and techniques, Dennis R. Chastain told managers of government DP sites, "Performance monitors can be utilized in evaluating existing systems to determine if requests for additional components or systems are justified."

Policy Change?

This represents a tentative policy change for GAO, he admitted, adding that in time he would like to see the "must" in place of the word "can" to give the statement some teeth.

He reminded the audience that GAO had issued a report in August 1972, which reviewed the use of CPE in government installations at that time, and recommended that the Office of Management and Budget direct heads of Federal agencies to "consider using" CPE to improve the efficiency of computer performance, especially before acquiring additional computer capacity.

GAO recently completed a research and development effort to determine the practicality of utilizing performance monitors to audit the efficiency and effectiveness of government DP sites.

"Our initial conclusion is that these tools will be a considerable aid to our auditors," he said. "GAO is preparing now to use [CPE] in an actual auditing situation to further establish . . . the procedure. If successful, GAO will use monitors on a more widespread basis."

When finally implemented, this "efficiency and effectiveness" auditing will be a more penetrating

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At IBM/Telex Trial

Economist Says IBM Has Clear Peripheral Dominance

By a CW Staff Writer

TULSA, Okla. – The economist testifying for Telex in its suit against IBM said last week that the "census" IBM had prepared for the Control Data case clearly showed IBM had a dominant market position in the peripherals business.

Dr. John Bonham, doctor of economics and professor at Tulsa State University, also told the court a monopolist was one who had enough market power to be able to do anything it wanted without fear of competitive reaction.

"It is the giant-pygmy concept," he said, noting the large company could take an action and force all of the smaller ones to react to it in a monopolistic industry.

In addition, he said, this type of market power allowed the giant firm to practice market price discrimination because it allowed it to lower prices in one area and then raise them in another in order not to have lower revenues across the board.

A monopoly can also change interfaces on products in its middle life, he indicated, forcing all the other firms to react to it.

The monopoly firm, he noted, also earns monopoly profits that are higher than they should be and which in turn allow more research and development. This "thing feeds on itself after a period of time," he noted.

Using data from the census IBM had prepared of more than 2,700 firms in the computer business, Bonham said those figures show IBM had 95.5% of the tape business at the end of 1970 with the rest of the competitors having only 4.1% at that time.

At the same time, he noted the IBM market share was probably understated because many of the other firms sold more equipment than they leased while IBM leased the majority of its equipment.

Outright sales tend to increase revenues the year they are made while leases defer them over a longer period of time. He indicated the census figures were based on firms' revenues and not number of units in the field.

In the memory area, Bonham said in 1970 IBM had 98.8% of the market with the remaining 1.2% split among five other companies.

In the printer market the situation was much the same, he said. IBM had total revenues in this market of almost $194 million where its nearest competitor had revenues of only $271,000, he said.

In the overall peripherals area, he said the census figures show IBM had 91.8% of the market while its competitors had 8.2% of the market. He again added that the IBM percentage was probably understated.

Efficiency Measured

In another analysis, Bonham compared the ratio of the net income before taxes divided by sales as a measure of the efficiency of a firm. He compared IBM with several other firms of different sizes in different industries to see how well their performance measured up.

IBM, he said, had a 24.5% ratio in this category which was higher than any other firm.

He said over the last 20 years the IBM ratio had varied very little, showing that its earnings had a very stable growth and were not affected by business cycles as its competitors' earnings were.

This type of stability, he said, indicates the firm has the ability to control its own future and its own life.

In another comparison, he said IBM's return on investment figures were very good even though they were not the highest of all the firms measured. Again with this measure he noted the IBM variation of return on investment was very small which indicated that it had good stability in its marketplace.

Summary Judgment Motion Expected

TULSA, Okla. – Telex was expected to end its presentation last week in its $1.2 billion antitrust suit against IBM.

Before IBM begins to present its case, it is expected the firm will move for a summary judgment rejecting the Telex claims which should be considered early this week.

In the Greyhound vs. IBM antitrust suit, the judge, in a decision that is being appealed, granted the IBM request for summary judgment and IBM was never required to present its defense.

Sources here feel Judge A. Sherman Christensen will not grant the IBM request and will make the firm present its defense, which should begin early this week.

Good Practice Code Correction

The British Computer Society "Code of Good Practice" is available in the U.S. for $3 plus a $2 handling and shipping fee from International Publishing Services, 114 E. 22 St., New York, N.Y. 10016.

Witness Claims Users Locked to IBM

(Continued from Page 1)

The main reason for going to the independents, he noted, was to save money, even though there were often slight performance improvements with the independent devices.

There really is no choice in the CPU area, he said, because none are compatible, but users have a definite choice in the peripherals area today, he said.

On cross-examination, however, IBM attorney David Boies got Martin to admit that just recently two banks in the Louisville area had switched the source of their mainframes, which seemed to indicate the switch might not be as difficult as Martin made out.

However, it was not brought out in court that the two banks had switched from GE computer systems, made by a firm which is now out of the computer business.

Martin also said the cost of the software library was not necessarily the major consideration when deciding not to switch, but rather the problems of conversion in the field.

While converting from one system to another, he said, there are great problems and when 300,000 bank customers rely on you, you can't afford to have systems problems during a switchover.

In all, he said not only would a competitor have to offer a great deal of dollar savings to get a user to switch systems, but it would also have to give him functional advantages he could not get with IBM.

Earlier in the case, Berton Hochfeld, now with F. Eberstadt & Co., and formerly with IBM as a market analyst, said IBM knew that if it cut prices, forcing Telex to do the same, it would make Telex a marginally viable company and give it a great deal of trouble in paying needed financing.

In addition, he said IBM knew that the price cutting measures would have largely the same effect on other firms in the plug-compatible peripherals business when it made the move, and he hinted that IBM purposely made the move to dry up those companies' sources of financing and drive them out of business.

Thomas Barr, the lead IBM trial attorney, repeatedly objected to the Hochfeld testimony, claiming Hochfeld was only a low-level "pencil-pusher" while at IBM and therefore not qualified to speak for the company and its plans.

Barr also tried to introduce evidence that Hochfeld might be guilty of stock "scalping" in his new job, but the judge ruled that this line of questioning was irrelevant to the case.

Papers Reveal Future Disks

(Continued from Page 1)

compete somewhat in the same market and because IBM decision-makers are putting more emphasis behind the Winchester program than the Midas program.

However, when and if Midas is announced, its price will probably be 60% of the 3330-type drive, according to the documents.

The other major development under way in the 3330-type drive area is called Iceberg and will be a double-density 3330 drive.

Reportedly the doubling of the capacity will be achieved in a manner similar to that used by the independents to double the 2314 capacity, according to the documents.

Twice the number of tracks would be written onto a single disk surface which would require a new head design with narrower track width.

However, the pack for an Iceberg will probably be different and unique from that of the 3330, the document said, since twice the number of servo tracks are required to be written on the servo surface.

Therefore, the documents say, the packs for the Iceberg will not be interchangeable with the present 3330 disk packs.

Both Midas and Iceberg are expected to have approximately the same stated transfer rate as the 3330.

The Winchester program, which saw its first product announcement in the 3340 [CW, March 21], is a completely new type of technology and is probably the forerunner of a new generation of disk drives.

The 3340 is available in two densities – 34.9M and 69.8M byte/disk pack, but it is expected that IBM will upgrade the line with additional versions being developed under the code name "Colt."

The Apollo drive is for the future generation, 375 family of computers, according to the court documents.

Last week *Computerworld* incorrectly reported the capacity of the Apollo drive. The documents actually show that the Apollo drive could have up to 1,000M byte/drive and could have a data rate of 1.6M byte/sec, double the 3330 speed.

However, even though some IBM documents show this capacity, both testimony in the case and other documents indicate this may have been overly optimistic.

It appears now that the Apollo drive – at least the first Apollo drives – will have a capacity of approximately 400M byte/pack or double the planned double-density 3330.

At the same time, it is understood that the Apollo will probably use a non-removable disk pack from the customer's standpoint, with the pack removable only for service.

The Apollo is not intended for the 370 market, the documents show, but will be designated for the FS systems that are currently under development. FS is believed to stand for "Future System" which would be the 375.

Presently IBM has funded a full-blown development effort on the Apollo drive and even though it is slated for announcement in 1976 there is some indication that it could be moved up to 1975 and used as an enhancement on the larger 370 processors as stepping stones into the FS systems.

Calif. Software Tax Stayed

SACRAMENTO, Calif. – The State Assembly has passed with one dissenting vote a bill which would continue permanently California's moratorium on the taxing of software.

The measure is now being considered by the Senate Revenue and Taxation Committee.

Emergency legislation enacted last year exempted certain software from taxation as tangible, personal property but the exemption runs out this year.

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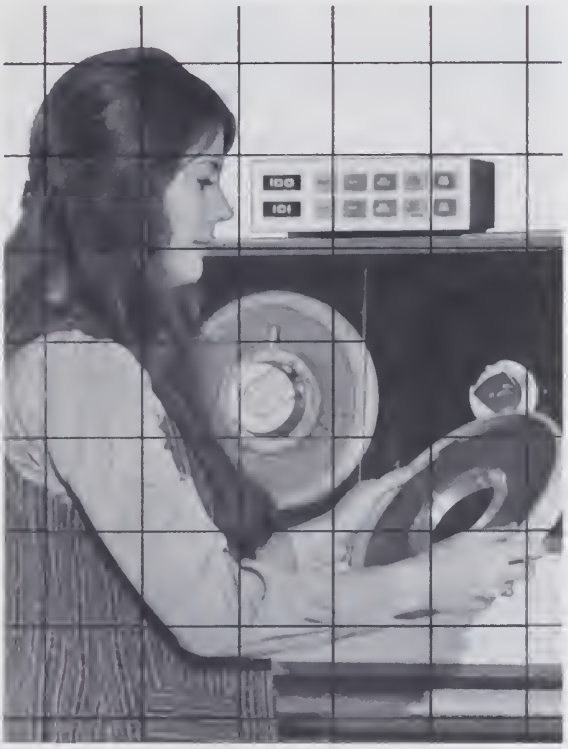

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Governor Commends DP Crew for Flood Recovery

(Continued from Page 1)

"By his quick action, thousands of data storage tapes containing vital information were recovered and restored to a usable level. Only quick action on his part could have saved the crucial information regarding the accounting system and the payroll and processing information for hundreds of state programs which utilize the central management information system."

More than half of the approximately 30,000 square feet of space in the computer center was under 11 feet of water during the flood crest. During the flood, the computer operations room containing a Univac 1108 computer system and all its ancillary equipment as well as 28 keypunch machines was completely destroyed.

"The tape file storage area which contained more than 18,000 reels of magnetic tape was the top priority," Ronald G. Lench, secretary of administration said.

"These tapes would have been lost, and we came very close to that, but for the dedication of the 123 persons in the bureau under Ippolito's direction," Lench said.

Ippolito had been on the job only four months when the crisis occurred but had sufficiently implemented several recommendations concerning possible contingencies such as fire or flood as recommended in the governor's Review of Management Report.

Tapes were actually being removed during the period that the water was cresting. Those which could not be saved because of hazardous conditions in the building were washed with household detergent and dried with hairdryers.

During the two-week period after the flood the entire computer center was reinstalled in a nearby facility and operation was begun again.

"It is interesting to point out not a single paycheck nor payday was unmet during this hectic period," the governor said.

It has been estimated that the original tapes saved by the reclamation process saved $250,000 in man-hours which would have been needed to reconstruct the tapes, assuming the raw data was available.

Prove Need Before Upgrade

(Continued from Page 1)

analysis of the installations' DP operations than GAO has performed before.

The problem with using any sort of economic justification for new equipment, he explained, is that almost anyone can list enough future applications to make the request seem reasonable. Even pointing to a system that is running around-the-clock on a current workload really avoids the issue, according to Chastain.

The central issue must be a determination of how well the current configuration is really being used "and that should be a consideration for any installation, not just the government ones that we ride herd on," he added.

Does a manager need new equipment if his present CPU is working less than 50% of the time the system is being used? he asked.

Chastain spoke at the two-day Scientific Computer Information Exchange Meeting sponsored by the Atomic Energy Commission.

Study Reveals Welfare Errors

BOSTON – A study of the computerized state welfare recipient list has revealed errors in 650 cases. Payments to these people have since either been reduced or terminated and will result in a savings to the state of about $57,000/mo, according to welfare commissioner Steven Minter.

The study revealed that about one percent of those receiving public assistance receive both welfare and unemployment compensation. A further check of the double recipients showed 361 cases or 26% are the result of fraud or misrepresentation. Payments in these cases have been reduced or terminated and are being referred to the Bureau of Welfare Auditing for investigation and prosecution.

In another 289 cases, or 21%, it was found that welfare payments were incorrect because of misunderstandings or delays in processing and these are being corrected.

In 41% of the cases checked, the double assistance payments were found to be legitimate. The remainder involved incorrect Social Security numbers or cases which have not been completed.

Grant Aids Health Research

DENVER – Health Care Management Systems, Inc. has received a $62,000 grant from the Robert Wood Johnson Foundation for research on computer applications in ambulatory health care services throughout the U.S.

The study is intended to identify which of the thousands of computer projects used in medicine could be of significant value; successful completion of this study should assist health agencies in choosing computer applications.

The project will involve a study of literature on existing computer systems followed by a study of representative systems.

Most Elections Officials Claim Systems Secure and Accurate

(Continued from Page 1)

According to the study, the average cost per registrant in counties using lever machine systems is $1.39, compared to $1.90 for the punched card systems and $2.05 for the paper ballot counting systems.

The computer-based techniques were only less expensive than their manual counterparts in one application area – the maintenance of voter registration lists.

Counties that have computerized this function, the study found, spend 42 cents less per registered voter than their manual counterparts. In all of the other application areas, the manual systems and computer systems cost approximately the same on a per registered voter basis, the survey reported.

Computer use in the elective process is still in its infancy, the report noted, pointing out that only 7% of the counties presently use punched card voting systems and an additional 2% use some sort of OCR system to help count votes.

At the same time, 16% of the counties use computer systems to maintain registration lists and 12.8% of the counties use computers to print summaries of election results. According to the report, 10.7% use computer systems "in some way" for ballot counting, since some of the counties using lever systems as the primary counting method, also use computers to some extent in the counting process. This is why this figure is higher than that for just punched card and OCR counties.

Only 9.7% of the counties use computers to actually produce election results, the survey found.

Overall, the survey discovered the punched card and OCR methods of election recording were most popular among larger counties.

Accuracy of L.A. Vote System Challenged

By Marvin Smalheiser

CW West Coast Bureau

LOS ANGELES – The accuracy of the computer punched card voting system here has been challenged by county supervisor Baxter Ward.

Ward asked the Los Angeles election commission for a "thorough review" of the system, which had a number of problems initially but which has been performing smoothly for the past two years.

Elected to the board of supervisors last fall, Ward expressed concern about the "security of the ballot" under the present system of punched card voting.

He said he wanted an extensive post-election manual recount to check against the computer count. There is now a manual recount of 20 precincts after each county election. The county has over 7,000 precincts.

Ward said he was curious about the accurancy of the computer system because of a check of the votes he received in the primary election last year. In at least 34 instances, he said, identical vote totals were reported for successive precincts by the computer.

In some cases, he said, two precincts in a row reported an identical total for him or his opponent. In some cases three precincts in a row and in one case four in a row reported the same figures.

Ward told the election commission he took the matter to a private computer firm, which said a four-in-a-row sequence of identical totals was a "million to one" mathematical coincidence. The firm said it could not explain what it called an "interesting" situation.

A check of precinct totals for another election in 1970, Ward said, also showed the "unique" coincidence of identical figures in sequence.

Safety Planning Unit To Analyze Data On Crimes in Schools

By Judy Kramer

Of the CW Staff

NEW YORK – The Board of Education here has set up a unit in the Office of School Safety to collect and analyze data on crimes and acts of violence in the city's schools.

The new analysis and planning unit will use the Board of Education's IBM 370 computers to analyze reports on violent incidents in the schools to learn more about the types and severity of crimes committed, which schools or areas are more incident-prone, when these incidents are most likely to occur, and what types of people (boys, girls, gangs) are involved in the incidents.

Input for the system comes from formal written reports of accidents or incidents in the school which are sent to supervisory personnel and the school safety office. The local police also send in reports of crimes in or near schools.

Everything entered into the computer system is of a statistical nature, emphasized W. Domenique, systems analyst and head of the unit. No names of students or teachers are included and all written copies of original incident reports are destroyed at the end of each school year to protect the students, he said.

Data collected from this system will be used to determine trends and plan new efforts to protect students and teachers. The unit's reports will be used as a basis for training security personnel and for assigning day-to-day security guards.

NCC Sessions Offer Chance for User-Industry Dialogue

NEW YORK – The first National Computer Conference (NCC), less than a month away, looms as an extraordinary chance for users and industry figures alike to actively engage in dialogue and interaction.

In addition to the "conference within a conference" approach, by which sessions are labeled either methods and applications or science and technology, there is a special program of in depth sessions, which gives attendees an unprecedented number and variety of sessions.

Advance registration for the June 4-8 NCC closes May 15. Prospective attendees should call the American Federation of Information Processing Societies, the conference sponsor, to obtain registration materials. Afips has a toll free number, 800-631-7070.

The conference fee is $50 for Afips members and $60 for non-members and includes a copy of the proceedings. A one-day pass to both the exhibits and the programs is $20 while a five-day exhibit-only pass is $15. Student fee is $5 from 210 Summit Ave., Montvale, N.J. 07645.

The following is a schedule of the sessions available at NCC. All locations are the New York Hilton except where specified at the Americana Hotel. Special sessions are in bold type.

Monday

1:30–3:30

Methods & Applications

1. Regulation of Computer/Communications Industry – *Robert Bigelow* – Sutton North

2. Voice Answerback Comes of Age – *Tom Fisher* – West Ballroom

3. Point-of-Sale Systems – *Richard K. Hampson* – Clinton Suite

4. Computer Use Around the World – *Bruce Gilchrist* – Nassau Suite

Science & Technology

5. What's the Computation in Computational Linguistics? (ACL) – *Robert F. Barnes* – Georgian A, Americana

6. Conversion Problems – *Bonnie Dunning* – Murray Hill B

7. Design and Development of Application Packages for Users – *Wayne B. Nelson* – Georgian B, Americana

8. Computer Evolution and the Next Decade (IEEE Computer Society) – *Ned R. Kornfield* – Sutton South

9. Trends in Data Base Management – *George Dodd* – Regency Ballroom, Americana

3:45–5:45

Methods & Applications

10. Legal Protection for Software – *Robert Bigelow* – Sutton North

Voice Answerback Comes of Age (contd.)

11. Data Processing Directions in the Retail Industry – *Richard K. Hampson* – Clinton Suite

Science & Technology

12. Simulation: Past, Present & Future (SCI) – *Philip J. Kiviat* – Georgian A, Americana

13. Intelligent Terminals – *Ira Cotton* – Murray Hill B

14. Computing for Statistical Purposes – Expectations Amid Accomplishments and Gaps (ASA) – *Mervin E. Muller* – Georgian B, Americana

15. Natural Language Processing – *Aravind K. Joshi* – Nassau Suite

Trends in Data Base Management (contd.)

16. Information Science and Technology from a Global Viewpoint – *Robert M. Landau* – Sutton South

Tuesday

8:45–10:15

Methods & Applications

17. 9-12, Performance Evaluation and Measurement – *Barry W. Boehm* – Sutton North

18. 9-12, Computers in the Elective Process – *E. Drake Lundell Jr.* – Sutton South

19. Publishing – *Frank Anzelmo* – Nassau Suite

Science & Technology

20. Instrumentation, Computers and Process Control (ISA) – *Arthur C. Lumb* – Gramercy Suite

21. Advanced Hardware – *John T. Lynch* – Murray Hill Suite

22. Information Science – Promises, Realities and Futures – *Jack Belzer* – Gibson Suite

23. The Use of Computers in Education (AEDS) – *Sylvia Charp* – Clinton Suite

24. Environmental Quality and the Computer – *Peter W. House* – Georgian A, Americana

25. A Day of the Computer Arts Music: Demonstrations, Presentations, Philosophy – *Stefan Bauer-Mengelberg* – Regent Room

10:30-12:00

Methods & Applications

Performance Evaluation and Measurement (contd.)

Computers in the Elective Process (contd.)

Publishing (contd.)

26. The Impact of Hand-Held Calculators – *Gregory Williams* – Beekman Room

Science & Technology

Instrumentation, Computers and Process Control (contd.)

Advanced Hardware (contd.)

27. Specialized Information Processing (SLA) – *Betty B. Brociner* – Gibson Suite

The Use of Computers in Education (contd.)

28. A Day of the Computer Arts: The Editors View Computer Arts – *Grace Hertlein* – Regent Room

1:30–3:30

Methods & Applications

29. Computers in the Congress – *Ernest C. Baynard* – West Ballroom

30. 1:15–3:45, Manufacturing Automation – *Robert H. Anderson* – Nassau Suite

31. Knowledge Dissemination – *Andrew A. Aines* – Gramercy Suite

Science & Technology

32. Performance Evaluation – *Marshall D. Abrams* – Gibson Suite

33. Information Networks–International Communication Systems – *Betty B. Brociner* – Murray Hill Suite

34. An Undergraduate Program in Information Systems – *Gerald L. Engel* – Clinton Suite

35. The Impact of Networking on Storage, Retrieval and Transfer of Technical Information – *Andrew J. Kasarda* – Beekman Room

36. A Day of the Computer Arts: The Computer and the Arts – George Arnovick – Regent Room

37. Economic Future of the Data Processing Industry *(Business Week)* – *Lewis H. Young* – Sutton Ballroom

3:45–5:45

Methods & Applications

38. Graphics Applications for the Garment Industry – *Fenton Gilbert* – Sutton South

Science & Technology

39. The Auditor's Interface with EDP Systems (Aicpa) – *Noel Zakin* – Clinton Suite

Performance Evaluation (contd.)

40. Automated Project Management Systems – *Ira Bitz* – Murray Hill Suite

41. Academic Computing at the Junior/Community College: Programs and Problems – *Harold J. Highland* – Rhinelander Center

42. The Growing Potential of Mini/Small Systems – *Douglas B. McKay* – Beekman Room

43. Networks and Data Banks: What Contents? – *Michael Lesk* – Sutton North

44. A Day of the Computer Arts: The Renaissance of Art-Science – *Kurt Lauckner* – Regent Room

45. Computer Technology as a Public Resource – *Alan Kaplan* – Rhinelander South

46. 7 p.m., A Day of the Computer Arts: Computer Generated Films – *Kenneth Knowlton* – Regent Room

Wednesday

8:45–10:15

Methods & Applications

47. Five Year Plans for Computers in State Government – *John Gentile* – Nassau Suite

48. 9-12, Computers in Automotive Design and Manufacturing – *Hans Kuschnerus* – Sutton North

Science & Technology

49. Computer History: Critical Turning Points and Software Developments – *William F. Luebbert* – Gramercy Suite

50. Interactive Computing: A Mind Expander (SID) – *Carl Machover* – Murray Hill Suite

51. Resource Utilization in the Computing Community (ACM) – *Herbert S. Bright* – Georgian A, Americana

52. Data Security in Government – *James M. Clayton Jr.* – Sutton South

53. A Graduate Program in Computer Science – *Michel A. Melkanoff* – Beekman Room

54. Wave Form Analysis in Clinical Medicine – *Harold W. Shipton* – Regent Room

10:30–12:00

Methods & Applications

55. Computer Operations of State Agencies and Universities – *John Gentile* – Nassau Suite

Computer Use in Automotive Manufacturing (contd.)

Science & Technology

Computer History: Critical Turning Points in Software Developments (contd.)

56. 10:45–12:45, Graphic Applications I – *Jackie Potts* – West Ballroom

Resource Utilization in the Computing Community (contd.)

57. Information Science and Technology through the Eyes of Asis (Asis) – *Robert M. Landau* – Murray Hill Suite

Wave Form Analysis in Clinical Medicine (contd.)

1:30–3:30

Methods & Applications

58. Interim Report from the IBM Data Security Study Sites – *C.L. Foster* – Murray Hill Suite

59. Urban Services I – *Ed Blum* – Nassau Suite

60. Off Vehicle Diagnostics – *Joseph P. Sweeney* – Sutton North

61. Status and Future of Software Products Worldwide – *Martin Goetz* – Sutton South

Science & Technology

62. 2:30–5:00, Graphic Applications II (contd.)

63. Views of the Future I – *Murray Turoff* – Gramercy Suite

64. Mathematical Software: State-of-the-Art (Siam) – *William Jameson Jr.* – Regency Room

65. Computing and the Law: Interactions – *Philip H. Dorn* – Regent Room

3:45–5:45

Methods & Applications

Urban Services II (contd.)

66. Development of Generalized Software Products – *James Porter* – Sutton South

67. Secure Data Systems – *Lawrence Foster* – Murray Hill Suite

68. 3:45–6:45, Advertising and Marketing – *Charles Gulotta* – Clinton Suite

69. Simulation of International Relations – *George L. Draper* – Gibson Suite

Science & Technology

Views of the Future II (contd.)

70. 5:15–6:45, Graphic Film Festival – *Jackie Potts* – West Ballroom

71. Satellite Packet Communications – *Lawrence G. Roberts* – Beekman Suite

72. Venture Capital for the Computer Industry – *Robert F. Johnston* – Regent Room

73. 8–10, Graphics in 3D: Sorting and the Hidden Surface Problem – *Rodney Allen* – West Ballroom

Thursday

8:45–10:15

Methods & Applications

74. In-house Training I – *Dorothy Tucker* – Sutton South

75. Onboard Computers for Automobiles – *H. Blair Tyson* – Trianon Ballroom

76. Data Integrity – *Milton Bryce* – Rhinelander North

Science & Technology

77. Storage Systems – *Ben M. Y. Hsiao* – Gramercy Suite

78. Tutorial on Resource Utilization in the Computing Process – *Herbert S. Bright* – Regent Room

79. Managing the Impact of Generalized Data Bases (by special registration only) – *Charles A. Philips* – Georgian A, Americana

80. Outlook and Prospects for Marketing Abroad – *Joseph Miller* – Clinton Suite

10:30-12:00

Methods & Applications

81. Inhouse Training II – *Peter Savides* – Sutton South

Onboard Computers for Automobiles (contd.)

82. Four Major Reports on Privacy and Computers – *John Gosden* – West Ballroom

83. Reliability for Integration into Human Affairs – *Donn B. Parker* – Sutton North

Science & Technology

Storage Systems (contd.)

84. Data Communications Via Satellite (AIAA) – *W.G. Schmidt* – Regency Ballroom, Americana

Tutorial on Resource Utilization in the Computing Process (contd.)

Managing the Impact of Generalized Data Bases (contd.)

Outlook and Prospects for Marketing Abroad II (contd.)

1:30–3:30

Methods & Applications

85. 1:30–3:00, Inhouse Training III – *Gail Buerger* – Sutton South

86. 2:30-4:00, Automobiles, Computers and the Consumer – *Herbert Mainwaring* – Trianon Ballroom

87. 1–4, Security and Privacy, in Specific Computer Systems – *James Riley* – West Ballroom

88. Computers Are for People – *Gabriel Groner* – Versailles Terrace, Americana

Science & Technology

89. Network Computers: Economic Considerations – Problems and Solution – *William J. Barr* – Gramercy Suite

90. Applications of Automatic Pattern Recognition – *Louis S. Rotolo* – Regency Ballroom, Americana

Managing the Impact of Generalized Data Bases (contd.)

3:45–5:45

Methods & Applications

91. 3:15–5:45, Inhouse Training IV – *Dorothy Tucker* – Sutton South

92. 4:15–6:00, Security and Privacy in Disaster – *Thomas B. Steel Jr.* – West Ballroom

Computers Are for People (contd.)

93. Metrication – *W.E. Andrus, Jr.* – Versailles Terrace, Americana

Science & Technology

94. Nontechnical Causes of Failure of EDP/MIS Groups – *Herbert Halbrecht* – Trianon Ballroom

95. Cryptology in the Age of Automation – *Henry Ephron* – Royal B, Americana

Network Computers: Economic Considerations – Problems and Solution (contd.)

96. Ingredients of Pattern Recognition – *Robert S. Ledley* – Regency Ballroom, Americana

Managing the Impact of Generalized Data Bases (contd.)

7 p.m. Managing the Impact of Generalized Data Bases (contd.)

Friday

8:45–10:15

Methods & Applications

97. Economics and Remote Terminals – *Dan Printz* – Royal B, Americana

Science & Technology

98. Virtual Machines – *Ugo O. Gagliardi* – Sutton North

99. What's Different About Tactical Military Computer Systems – *James A. Ward* – Royal A, Americana

100. Associative Processors – *P. Bruce Berra* – Madison Suite

101. Computer-based Integrated Design Systems – *Herbert M Ernst* – Princess, Americana

102. Discrete Algorithms, Application and Measurement – *Michael L. Krieger* – Sutton South

103. Career Development for Computer Professionals – *Paul Oyer* – Versailles Terrace, Americana

Managing the Impact of Generalized Data Bases (contd.)

10:30–12:00

Methods & Applications

Economics and Remote Terminals (contd.)

Science & Technology

Virtual Machines (contd.)

What's Different About Tactical Military Computer Systems (contd.)

Associative Processors (contd.)

Computer-based Integrated Design Systems (contd.)

Discrete Algorithms, Application and Measurement (contd.)

Managing the Impact of Generalized Data Bases (contd.)

'Special Regulations' for Each Country

World Group Urges Right of Inspection of Data Banks

By E. Drake Lundell Jr.

Of the CW Staff

PARIS – All private data banks containing personal information should be regulated just as credit data banks are in the U.S., and governments should consider allowing citizens to see government information kept on them in public data banks, according to a "restricted" report prepared by a subcommittee of the Organization for Economic Cooperation and Development (OECD).

The report, submitted to the OECD's Computer Utilization Group, noted that "central governments are faced with the problem of engendering public alienation over the personal and societal implications of the computer," particularly in the area of personal privacy.

Because of this, the report recommended, "public uncertainties regarding data confidentiality and security should be resolved as quickly as can be achieved in each country."

To help overcome this public fear, the report stated, "special attention should be given to the question of the individual's access to public and private files containing personal information on him."

In addition, the report recommended that "the use of data from private data bases, such as credit reference, medical, insurance and business personnel records, ought to be subjected to special regulations."

The report also indicated that governments should launch " formal programs" to "apprise the public of the characteristics of computers, their use by government, immediate and future benefits."

In addition, the report noted that for some fast-changing files it would be hard to provide an up-to-date printout to people identified in it.

However, the report found that a more workable solution might be to allow persons to inspect their files where they were being kept, much as the Fair Credit Reporting Act does in the U.S.

But, it noted, at present it would be hard for all government agencies that kept records on individuals to meet "the demand of curious constituents if this were a public policy.

"Perhaps later, when the personal identifier becomes a key to release file information at the local post office terminal, such an access right can be contemplated."

As a compromise to releasing a person's complete file or letting him inspect that file, the report suggested allowing individuals to "challenge and rebut derogatory information in personal files in government departments and agencies."

To do this the governments would have to inform an individual that a certain file was the source of information that prevented him from getting some benefit and then allow him to see that file and delete or correct any inaccurate information, the report said.

Including this right of inspection whenever information in a file is used to deny a citizen something should go a long way toward allaying the public fears about the retention of records in computerized data banks, the report added.

The report noted that today "there is wide agreement on the desirability for installing computers for recordkeeping and more sophisticated tasks in public administration" among the 14 member countries that make up the OECD.

However, it stated that "the issues before central governments are changing from a commitment to install automatic data processing to the best practice governing its use" once installed.

Security Downplayed

While consideration is being given to some other areas of computer operation, the report noted "the installation of security techniques in a data base containing health, economic, welfare, census, housing, political or other categories of data which include personal identifiers is not being actively considered by any country, as far as could be determined."

Rather, the report said, "rules of prudent administrative management information collected by central governments on their citizens are considered sufficient protection of data integrity" in the countries surveyed.

But the report indicated that "there seems to be a need to examine higher levels of data confidentiality for traditionally routine files."

Even though the report found a need for more protection for personal files, it said that "the notion that every citizen has a right to computer printout of all (non-security) records held by central government was found to require further investigation to determine its feasibility."

The cost and complexity of providing every citizen with a printout of his files, the report indicated, "would probably bring to fruition a centralized intelligence data base employing standard personal identifiers, an effect generally opposed by those supporting the notion of a right to printout."

Computer May Hold Key To Ancient Mayan Glyphs

UNIVERSITY OF MEXICO – The hieroglyphic writing of the ancient Maya Indians, which has puzzled scholars for centuries, is now beginning to yield its secrets thanks to some modern decipherment techniques.

One method being used by a group of scholars at the Center for Maya Studies at the University of Mexico combines the computer and linguistics.

The scholars are compiling a computer catalog of pottery glyphs and two of the three existing Maya books (codices) now preserved in museums in Dresden and Madrid.

By assigning numbers and letters to represent the different parts of glyph "sentences," they hope to construct a computer "map" of the books. The glyphs are normally arranged in "cartuches," four- to six-character sentences. Thus a cartuche might be represented in a printout as DO4W – E45E – J82P – M08U.

When this task is completed, it should be possible to compare different parts and spot frequently used constructions.

The computer project, coupled with the current independent project of a linguist who is trying to recreate the ancient Mayan as spoken when the codices were written, will hopefully provide the key to the written language.

L.A. County to Monitor Justice Systems

CW West Coast Bureau

LOS ANGELES – The district attorney of Los Angeles County is planning to set up a management information system which would monitor the performance of the county's criminal justice system from police to prosecutors to judges.

Promis (Prosecutors' Management Information System) is expected to be on-line in about three years at a cost of $1,079,484, partially funded by the Federal Government.

It is intended to give visibility to and standardize procedures in the criminal justice system to insure equal and consistent justice in various parts of the county.

Robert Martin, special assistant district attorney, said the system would be implemented in two 18-month phases.

One will be for software clean-up and the second for selecting and automating those portions of the district attorney's functions most susceptible to data processing.

The software will be developed by a joint project team of top executives and deputies and an outside consultant not yet selected.

News Wrapup

Decimal Point Error Delights Shareholders

NEW YORK – The dividend checks read 75 cents per share and 32,000 shareholders of Dart Industries, Inc., of Los Angeles, were celebrating the unexpected increase of almost 70 cents per share.

The celebration was soon cancelled, however, as were the checks which had been mailed out by Morgan Guarantee Trust Co., dividend-disbursing agent for Dart Industries.

New checks will soon be received by shareholders, but with a small alteration – the decimal point has been shifted. Corrected statements will read 7-1/2 cents per share, which is what the originals would have read if a programmer hadn't input wrong data, according to Russ Everett, spokesman for the bank.

"It was strictly a human error, not connected with the computer in any way," Everett said. This human error nearly cost $13.5 million.

DP Does It Again

HOLLYWOOD, Fla. – They've done it again – computers have helped police track down a stolen car, but this time it was a double coup.

After Bernie Seville allegedly took a 1965 model car from a garage on approval and never returned the vehicle, Newcomerstown, Ohio, police input the information into the national crime information file.

According to Florida police, Seville managed to obtain a title and Ohio license plates for the car and drove it to Hollywood, where it was stolen when he parked it on the street.

Seville reported the theft to the Hollywood police who fed the information into their computer. The computer indicated that Seville himself was suspected of originally having stolen the car. He was then apprehended and held for the theft.

Harlem Center Opens

NEW YORK – A new community-oriented DP center has opened in Harlem which will serve black businessmen, train black computer operators and keypunch operators and funnel profits into a fight against some of the community's "many ills," according to Heyward B. Davenport, chairman of the board of directors.

Har Computer, Inc. expects to reap $250,000 in profits by next April, Davenport said.

Firm Fermenting Fake Food

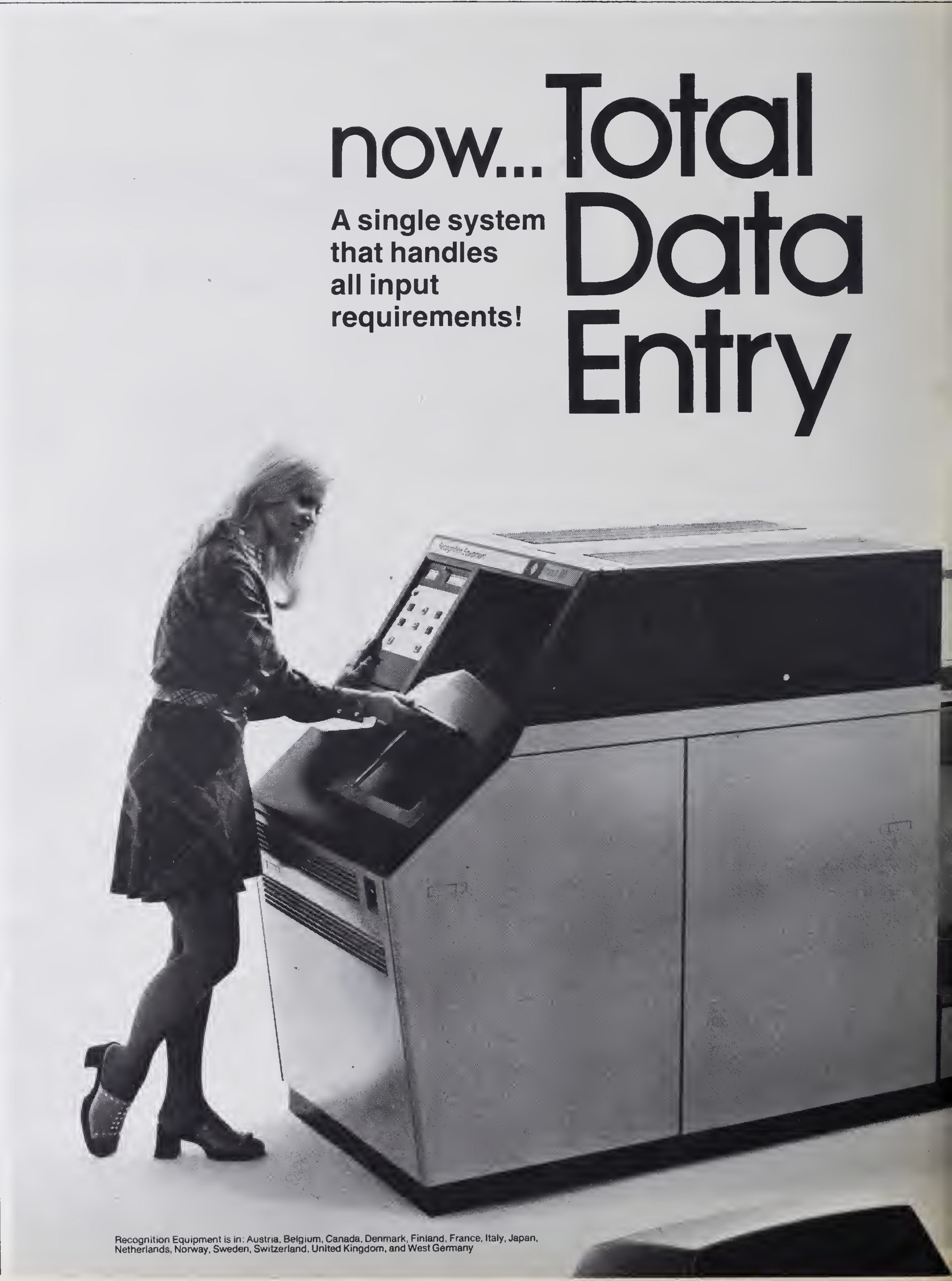
LEHIGH VALLEY, Pa. – One-celled organisms are teaming up with computers to produce a myriad of life's essentials through Fermentation Design, Inc., whose products include antibiotics for medical purposes and enzymes for laboratory studies and industrial applications.

Fermentation Design's business is to design and manufacture complex research systems for other companies engaged in production fermentation, the manipulation of large colonies of single-cell organisms to produce marketable quantities of organic products.

A computer simultaneously monitors and manipulates cultivated organisms' environments to find a combination of factors that will maximize the microbes' productivity.

One Fermentation Design Project is the biosynthesis of protein for food value – the manufacture of "synthetic food."

Biosynthetic protein can be added to processed foods as a filler or spun in much the same way sugar crystals are spun to make cotton candy. Spun protein can be formed into shapes and textures that people recognize as real food.



Church Seeks Disclosure of IBM S. African Dealings

By E. Drake Lundell Jr.
Of the CW Staff

NEW YORK – Charging IBM with breach of promise, the Episcopal Church has renewed its efforts to get the firm to disclose information about its dealings in South Africa.

The church, which owns over 8,000 shares of IBM stock (worth more than $3 million), has even filed a stockholder resolution that was included in the IBM proxy statement, asking the firm to provide "basic data" about its South African operations and employment practices so that stockholders might give those practices "thoughtful consideration."

Discussion of this proposal dominated the annual meeting of about 1,200 shareholders last week before it was defeated.

Frank T. Cary, president and chairman told the shareholders he felt IBM could do more good by staying and working in that country.

At the same time the church's Committee on Social Responsibility in Investments filed the resolution, Paul Neuhauser, committee chairman, charged that IBM had not lived up to its promises to supply similar information last year.

The church, he noted, had filed a similar stockholder resolution last year for inclusion in the IBM proxy statement, but it had been withdrawn prior to the annual meeting when the committee and IBM agreed on a draft report that was to be presented at the meeting.

However, Neuhauser now charges that the company "omitted much of the factual material" which IBM had promised to supply. In fact, he said, 80% of the material in the draft report was omitted from the report of the annual meeting.

He also said that IBM had agreed to provide information in separate categories in response to last year's stockholder resolution, but charged that only one of the areas "was fully complied with, and in each of the other eight instances either the promised information was not supplied at all or it was supplied in an inadequate fashion."

IBM said last week that "we think that we provided enough information last year," and a spokesman said the firm was against this year's request because it asked for an "inordinate amount of detail."

The IBM board of directors has urged the shareholders to vote against the proposal.

The Episcopal Church is a member of a six-church consortium called "The Church Project on U.S. Investments in Southern Africa – 1973," which is challenging some of the largest U.S. corporations about their investments in South Africa.

While the churches were stepping up their campaign against IBM and charging it with deceit in its agreement last year, they at the same time cleared another computer company, Burroughs Corp., from a proxy battle, because Burroughs voluntarily agreed to publish a report of its activities in South Africa and on other social issues.

Investment Details

The resolution filed with IBM asks for information on the annual capital investment in South Africa since 1962; the annual profits; the number of employees by race; contractual relations with the government there; and taxes paid to the South African government.

It also seeks "a listing and explanation" of grants and charitable gifts made there by the company since 1962.

In the area of relations with workers, the resolution asks the firm to supply a listing of current wages and employee benefits by functional job description comparing workers of different races and a summary of such wages and benefits and promotions for whites and non-whites since 1962.

It also seeks a listing of grievance procedures open to African workers and questions whether the firm has any trade union contracts that restrict the opportunities for Africans.

Furthermore, the resolution seeks a description, by race, of "technical training, general education, legal assistance, housing or other programs provided by the corporation for workers or their families."

It also asks for a description of the firm's investment plans for the border areas of the Bantustans and a description of the total number of non-South African personnel employed in the country and the international recruiting programs of the firm.

Finally it requests that the firm describe and explain "those South African laws which directly affect the corporation's employment practices and the working conditions" of African workers and a statement on compliance with those laws and on what action the firm has taken to get them changed.

The church also seeks a list of products sold for military and police use to the South African Government since 1962.

Editorials

A Clean Slate

IBM should supply the Episcopal Church with information on its operations within South Africa.

It is hard to understand why the IBM Board of Directors is fighting this request – Burroughs and Mobil Oil have proved that firms can comply with the proposals adequately without bankrupting themselves.

Surely with IBM's resources, the answers to the questions asked by the church are probably already available somewhere.

Last year IBM released partial information on its activities in South Africa which made the firm look very good in its employment and training practices for Africans. Surely the release of similiar information this year would also reflect favorably upon IBM.

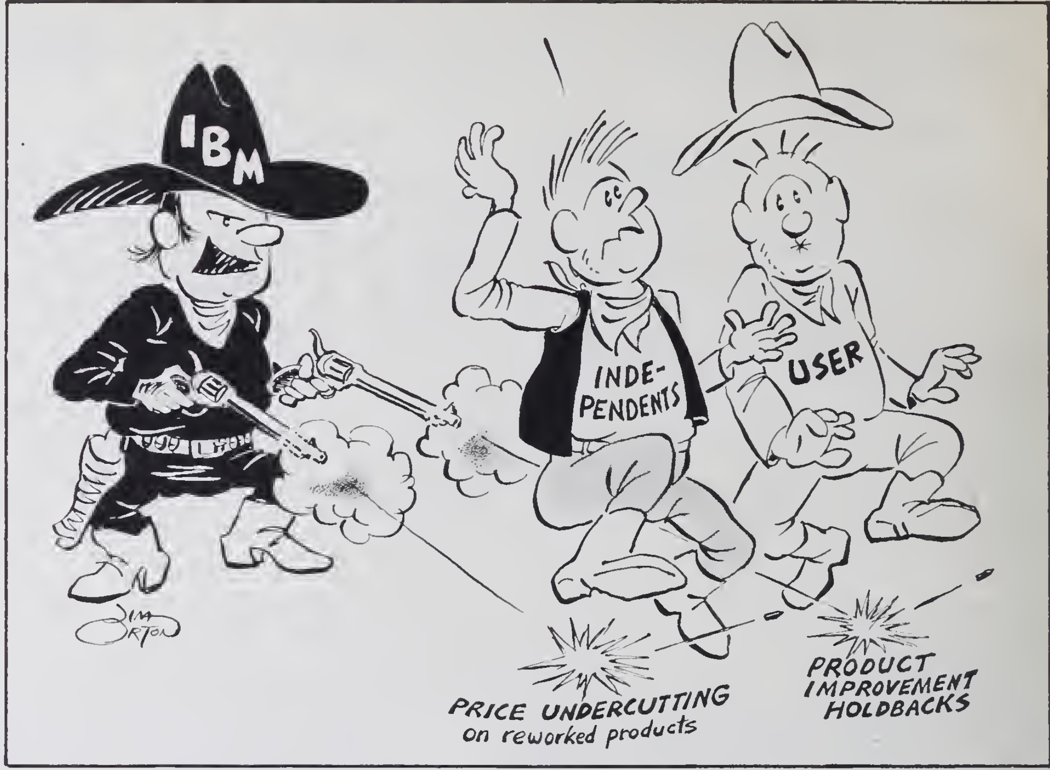
Breaking the Silence

The relationship between a DP user and his vendor is not a private domain that must be protected at all costs. While some vendors would have this relationship protected in much the same way a patient shares confidences with his doctor, most users object.

The myth that secret negotiations between user and vendor lead to favored treatment and discounted prices for the customer cannot be verified. And subservience to the whims of the vendor should not be required for proper treatment for the user.

Fortunately, most users enjoy a reasonable relationship with their vendors and their DP systems meet many, if not all, of their expectations.

So it is unbelievable that some users believe they must suffer in silence, lest they incur the wrath of their local salesman and his superiors.



'Dance!'

Letters to the Editor

Open Letter to IBM On Support for RPG

Mr. Jim Homet
IBM DB/DC Systems
1133 Westchester Avenue
White Plains, New York 10604

Dear Mr. Homet:

I am writing you with the hope of motivating the IBM Corp. into giving additional support to RPG II under DOS. Specifically, I am referring to:

- Compatibility with CICS/DOS. As you know, only COBOL, PL/I and assembler are supported.
- Compatibility with a Data Base Management System (VANDL/1 or DL/1).
- Ability to OPEN and CLOSE files in the calculation specifications.
- Ability to define an Isam file for sequential processing and also be able to chain to the same file without having to redefine it as a chain file.
- Ability to read an Isam file with a partial key.
- Relative addressing of positions within a field or record.
- More indicators.
- Ability to use registers in the calculation specifications.
- Ability to update a sequential file at total time.
- A cross reference list at the end of a compilation showing each field and every statement it is used with.

RPG II has proven to be one of the most productive commercial languages now available on the market. It is significantly superior to Cobol both economically and productively.

I would need five Cobol programmers to do the work of three RPG II programmers. (See related story on page 15.)

The greatest and most important enhancements that IBM could make to RPG II are CICS and Data Base Management support. We use RPG II for all of our batch systems and CICS/DOS for our on-line systems.

The enhancement mentioned above would only be used a small amount of time, but would be very helpful when needed. Such enhancements would make RPG II a much more powerful language.

Managers are interested in productivity and from this standpoint, RPG II can't be beat. If IBM would only give it the additional support it needs, IBM would make a major contribution to the efficient and economical use of computers.

Mike Pauken
Director, Data Processing
St. Vincent Hospital and
Medical Center
Toledo, Ohio

Computerworld welcomes comments from its readers. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

(other letters and viewpoints on Pages 12 and 13)

10 Guides Can Help Manage System Design

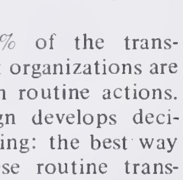
These ten "commandments" should help manage the design of our information systems (see Siemens et al, *Operations Research*, N.Y., The Free Press, 1973):

1. Systems have a triple function: to get action, to record that action and to report the results.

When an organization grows beyond a one-man operation, efficiency suggests specialization of labor. As continued growth is matched by spreading specialization, someone must begin concentrating on coordinating the activities of these specialists.

Management

By Frank Greenwood, PhD



Organizations thus consist of specialized parts which are coordinated by management. Information binds these split parts. The information system gears individual contributions to the overall plan and coordinates the specialists.

Probably 90% of the transactions in most organizations are concerned with routine actions.

System design develops decisions determining: the best way to handle these routine transactions, who does what, the forms needed and the policies and procedures governing the effort. If 90% of the transactions pass through this type of systems channel, it is fast and cheap, leaving only 10% to be handled as nonroutine exceptions.

2. Systems are natural cycles.

Find the pattern of 90% or so of the transactions. Identify the major objective of this bulk activity, where it starts, where it ends and the process points between. This defines the system to work on. Ignore department boundaries because they seldom coincide with system parameters.

3. Emphasize the work objective.

Define what results from the pattern of activity which makes up the system cycle. This limited work result needs to be related to the other goals of the organization, coordinating the overall effort.

4. Systems improve coordination.

Systems help coordinate by gearing individual effort to overall objectives. This requires careful analysis of how the work should be done, including: people's skills, procedures, data, machines, forms and policies. Information systems help achieve coordinated effort by getting action, by recording that action and by reporting the results.

5. People make a system work.

Operating (often clerical) people can make a poor system work or a good system fail. Therefore, involve these individuals in the system design early. Listen to them. Give them credit for their contributions. Keep them informed.

6. Forms and procedures are important.

Forms carry the data in the system and should be designed with this basic role in mind. Procedures are equally essential, helping to coordinate by defining who does what and when.

7. Minimize data handling.

Handling data is expensive, so avoid it. Eliminate recopying the same data, which is both costly and error-prone. Give each work station only the data to do its work (often reporting by exception).

Give particular attention to the connections between people working; that is, watch the transfer points, establishing where the responsibility of one person ends and where that of another begins.

8. Get machine-readable data early.

Record the data at the point of origin in machine-readable form. Capture enough data at this point to serve all the subsequent data needs of the system. Process the data mechanically from then on.

One way to design a system is to begin by defining the specific output reports, and then to work backwards to identify the inputs needed for that output. This approach is alright until promotion, transfer or retirement brings in a different executive to head up the office for which these output reports are designed.

The new fellow will probably need different reports, since his style of management is different. Much of the system now must be redesigned and reprogrammed to pick up the new input needed for his new output reports.

Therefore, a better way to begin the system design is to start by defining the data base (instead of just some specific output reports). That is, determine what data is needed now and what may be needed later by all offices using the system.

This involves where to best capture the data and how to maintain it (e.g., women change their names when they marry, people change addresses, and so on). With a carefully reasoned data base available, changing the output reports becomes considerably less work.

9. Balance costs and benefits.

System design weighs costs and benefits, considering speed and quality. Improving one factor usually degrades another, so it is a problem of optimization.

10. Documentation is critical.

Information systems are intangible (for example, holes in cards). The chief tool for planning and controlling system design is documentation. Documentation is a written record of the system, including: its purpose, what the input data is, what each work station does and who gets what output reports.

Creating and maintaining this documentation is critical. As each stage is planned, ask the user to "sign-off" on the specifications so that when the systems analysts then do what they are supposed to, systems specifications cannot later be redefined unilaterally by the user.

An information system cannot be automated until the manual system is in good shape.

(Frank Greenwood is a computer center director at the University of Montana.)

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Who Should Decide American Position On International Standard Interface?

The Taylor Report

By

Alan Taylor, CDP

I would like any computer I own to have the ability to be connected to any peripherals I own – and I think most computer owners and many computer borrowers would agree. However, at the moment, an official U.S. position is being formulated which would have the U.S. oppose any further work on international standard channel interfaces.

I discovered this apparent discrepancy between the opinions of the public, and those of the Ansi committee which considers itself responsible for formulating and presenting these opinions on the international standarization stage last month. The committee sent out a recommended position, opposing any further work on the project, which I disagreed with.

Many Unrepresented Areas

I talked to members of other groups which one would expect to be involved in such matters. I talked to people who own many computers – the leasing companies. I talked to people who own and manufacture peripherals – the computer service firms. I talked to educators, computer auditors and users.

All over I found that American opinion was in favor of such work, yet my soundings also told me that the position against it would be adopted as the official position. Response to the recommendation had a 30-day limit.

The recommendation will probably be accepted because eight or 10 individual computer mainframe manufacturers will probably vote for it on the Ansi committee – and their votes will be counted on a company by company basis in the formation of what is called "a consensus."

By contrast, there won't be any votes from the computer auditors, the leasing companies, the computer service industry or the people who buy and sell computers.

From the point of view of computer manufacturers, a standard interface capability could hurt their corresponding sales of overpriced peripherals to users of their mainframes; the replacement of one mainframe generation with another also generates peripheral revenues. So I can see that standard interfaces are not first priority items for mainframe makers. But they are only part of the community. Other parts have the right to be heard also.

> *"The one compelling reason which may yet make me oppose further work on the interface standard is the inadequate support currently available. If there is one thing I want less than not having a standard interface of some kind, it is having a standard that does not work!"*

Ansi Regulations Give Right

Ansi has seen to it, by providing various sets of regulations, that it can be heard. The SCDP membership on the X3 Committee, which must approve the current recommendation, is itself proof that the Ansi-protected right to be heard is real. Why then is it not used?

The real reason other interests are not being heard is simply because they have not accepted the fact that they have a *duty* to make themselves heard, as well as a right to be heard. The failure of the Ansi committees to really be representative of the community feeling, and yet be able to produce persuasive ballots showing everything is being approved by the consensus method is because the other interests have not accepted such a duty.

Ansi Interface Recommendation

The U.S. member body has at this time no technical response to ISO/TC97/SC13 (Japan-1) 2 because it believes that further technical work toward the goal of achieving a channel level interface at the ISO level will be of minimal value due to the following considerations.

- We believe that support for a channel level interface throughout the ISO community is diminishing. The Ecma General Assembly has asked to withdraw support of the Ecma proposal for a channel level interface as reported in Ecma/GA/72/44. The U.S. National Bureau of Standards (Center for Computer Science and Technology report on "Means of Achieving Interchangeability of Computer Peripherals) has recommended that no attempt be made to develop a single Federal interface standard. It appears that German and UK member bodies have now decided not to generate a channel level interface proposal.
- As expressed in U.S. comments on TC97/SC4/WG4 N135, the U.S. member body believes the "interface standard administration" issue is critically important. The lack of an acceptable resolution to this issue represents a significant obstacle to the implementation of the proposed interface standard. Until there is indication of resolution, it appears to us inappropriate to pursue the technical interface definition, since we believe administration problems are likely to prevent the realization of a standard.

For these reasons, we have decided not to provide further technical comment on the proposed channel level interface working paper.

An Ansi committee officially recommended that the U.S. no longer participate in an international effort to develop a standard channel interface.

I think they should. It is my hope that the various organizations that have been set up to speak for the various areas of the computer industry should join in and actively participate in determining the American positions.

Such groups as the Computer Dealers Association, Inc., Computer Industry Association and the Computer Lessors Association should get involved.

Ansi rules say that as long as there are areas where organizational representation is not available, individual companies can also join.

Support Needed

I would like to ask your help to get these organizations to take up their proper role and to provide support for such important work. It need not involve much money to get support. And support is actually the problem we face with regard to getting standard interfaces.

The one compelling reason which may yet make me oppose further work on the interface concept, is not because the National Bureau of Standards has reported against it, but instead because of the inadequate support currently available.

For if there is one thing I want less than not having a standard interface of some kind, it is having a standard that does not work!

You can help by filling in the questionnaire and saying what you think. Then we will see what can be done to persuade the community organizations to play their role. Perhaps even in time to save the interface program.

Who Should Represent U.S.?

I think the following areas of the community should be represented when decisions are made on the U.S. position on channel interfaces.

What organization(s) could represent these community interests?

☐ I personally
☐ My organization
would support such representation.

Name Professional Position
Memberships
Address
City or Town State Zip

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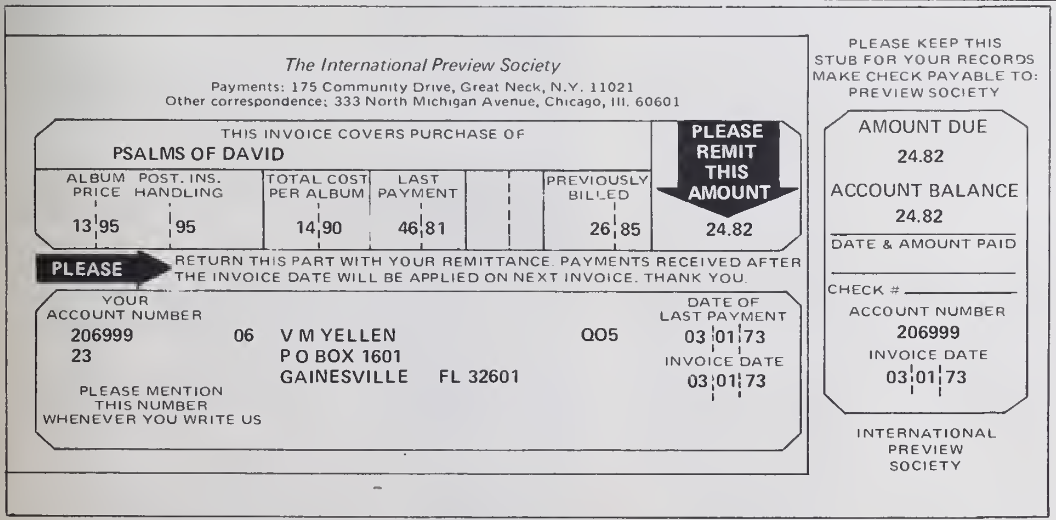

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Why Didn't They 'Preview' This Bill?

The International Preview Society recently sent this computerized bill to *Computerworld* reader V. Yellen. What he wants to know is how they arrive at $24.82 owed from an album cost of $14.90 and payments of $46.81 on a previous billing of $26.85. Can you help?

Must Start From Within

CDP Needs Positive Help, Not Prophets of Doom

By Kenniston W. Lord Jr.

Special to Computerworld

If one were to take the perspective of some recent prophets of gloom, one might come to the conclusion that the CDP program, and all it has attempted to be, has gasped its final breath.

Nobody denies that the CDP program has not been "everything it has been cracked up to be." It is for that precise reason that groups of CDP holders have attempted to organize over the years.

The parent of this "teenager," while continuing to administer the test, has done little to promote the value of the certificate and the person who holds it. No attempt has been made, since its inception:

- To answer the question, "What shall he certify?"
- To convince corporate management anywhere that this was a worthwhile individual to hire.
- To reach the attorneys general of the several states to seek a legal status for this individual.
- To produce a code of ethics with teeth in it, with an evaluative measurement, or with enforcement procedures.
- To organize these "children" into a national force to bring strength to the profession.

The entire industry has stood by and let the function be labeled as non-professional. There is no loyalty where there is no strength.

The basis for these people to function is standards. To my knowledge, the parent in this case is not a working member of any standards activity. In truth, the parent is unable to certify to American industry that the recipient of this certificate has accomplished anything short of the accumulation of certain amounts of education, certain lengths of experience and the ability to answer eight hours worth of multiple-choice questions.

How many more headlines like "The Great Fraud: DP or Not DP?" will be required before the attorneys general start raising holy hanna with the data processing practitioner? How many more documented cases will be required before business and industry rises en masse to demand the same quality service from their data processing professionals that they do of any other licensed or certified group of individuals?

Viewpoint

We license a variety of professions and para-professions not merely as a source of revenue, but as a guarantee to the user of that service that the individual is competent to perform that service, with the right to the recovery of damages if he is not. Why should it be any different for the data processing individual merely because he is buried in the folds of a corporate empire?

How many more credit card fiascos will the public stand for? How much more abuse of corporate power, power obtained by blaming the computer, can we stand?

Not everyone who holds the CDP could be called a professional, just as not every professional, in the true sense of the word, is a CDP. But it has to start somewhere. And it has to start with us. If it begins at the urging of non-DP people with legal leverage, we no doubt will be very unhappy with the results.

There are a whole cadre of people who need to be certified – not with just one test, but it is becoming very obvious that they must be certified by many and varied measurements. The new parent, the Computer Foundation, must give the program and whatever other programs it assimilates or develops, the teeth and tenacity it will demand.

Legal stabilization must be sought. Diverse measurement must be developed. Upgrade training must be developed and implemented, with or without recertification. A campaign of education and information must be undertaken throughout the country to both gain industry acceptance of the individual, and to insure that the individual performs as required.

New tests must be developed, preferably by individuals whose business is tests and measurements. A system of state codes must be developed and licensing obtained, if not for all data processing individuals, then certainly key data processing personnel and those who interface with the public. A decent code of ethics with an appropriate enforcement mechanism must be developed, subscribed to and implemented.

This is the mandate to those of us who are determined to keep the CDP program alive. It would be useful if its detractors would spend their time in assisting us to build in a positive direction, rather than seeking to destroy what the program's parents, however ineffectively they may have executed the plan, have built.

Kenniston W. Lord is an EDP educational consultant and vice-president of the Society of Certified Data Processors.

Letters to the Editor

Are Old-Timers Afraid Of Young, Bright DPers?

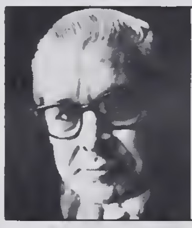
I take exception to the remarks made by Joseph T. Rigo in the April 25 issue.

There seems to be a kind of masochistic syndrome that is being fostered within the data processing field. There seems to be some kind of delight in tearing down, tearing apart, nit-picking at every thread and fiber until the whole fabric of this highly technical and professional activity is in tatters and is subject to general ridicule, contempt and suspicion.

Are these negative people afraid that there are just too many new, brighter and more knowledgeable people entering the data processing field? Are they afraid that their prestige is in jeopardy? The reaction is not unusual. It has happened many times in history as the old-timers are threatened by the new-timers.

Let us be a great deal more realistic and practical and positive in our opinions about the data processing field. If you do not like the climate of the data processing field, seek another avocation.

Robert R. Hamilton
Manager
Electronic Systems
and Methods Division
Prudential Insurance Co.
Boston, Mass.



Does RPG Help Produce a 'Professional Product'?

By Reginald D. Gates

Special to Computerworld

I've been interested in the recent exchange of letters regarding RPG. Although I was originally trained in assembly language and my current assignment is Ansi Cobol, I've had experience with System/3 RPG, DOS RPG and OS RPG. In the past year I've been involved with a project that converted over 50 System/3 RPG programs to run under RPG on the IBM 370.

I quite agree with the viewpoint that languages are simply tools to perform a task. Even though we select our tools according to the task's requirements, this does not prevent us from evaluating the tools. The basic question is, "Does the chosen tool help us in producing a professional product?"

A professional program has at least the following characteristics. The program can be run by an operations group without the programmers' intervention; the program can be easily understood, debugged and modified by someone other than the original programmer. RPG does not lend itself to producing a professional program as judged by the above criteria.

The Archilles heel of most RPG applications seems to be the second criterion. A few reasons why RPG does not seem to be adaptable to professional programs are:

Viewpoint

- The language itself is more difficult to understand than the near-English language of Cobol.
- It is extremely difficult to produce an intelligible flowchart of an RPG program (at least, I've never seen one).
- There are no execution time debugging facilities such as the "Display" verb or IBM's "Ready Trace."
- All the RPG halts possible are not documented, especially the ones dealing with chained files.
- In RPG, it is not possible to work backward from an interrupt and a core dump to the source code that produced the interrupt.
- There is no convenient method for stating the meaning of each indicator used in the RPG program.
- RPG does not lend itself to modular programming, i.e., coding and testing a program in logically related sections.

Finally, a word about "productivity." The obstacles to producing professional programs in RPG can be overcome by expending quite a bit of effort in the area of documentation. However, most programmers and their managers seem to feel that documentation is not "productive" work, and will bypass the documentation for more interesting tasks.

An RPG programmer can produce a working program in less *coding* time than a programmer using Cobol, but the RPG program will be lacking the necessary documentation. It will take more effort to properly document the RPG program so that the productivity gained by RPG in coding will be lost in documentation.

Of course, if a professional product is desired, the documentation for RPG can be minimized, and the programming staff can appear to be very productive.

Whatever language is used, products of a professional nature should be the objective of every programming staff.

Reginald D. Gates is employed by McDonnell Douglas Automation Co., Huntington Beach, Calif.

Letters to the Editor

Certify People First

Alan Taylor, you're on the wrong road!

In the April 4 issue you support Jerry Martin's idea for certified documentation and certified testing as the second great step forward for mankind, while giving next to no consideration to this vital question: "Who's going to do the certifying?"

I recall seeing only four words in the entire article which addressed this question: ". . . who should give them, . . ." – although that has been, and probably will continue to be, the key question. Now, I'm asking you: Who's going to certify that the certifier is qualified to certify? And, how?

I don't disagree that documentation and testing certification are good ideas, but most organizations heavy in EDP already have the people to do this job – their own internal auditing departments!

Maybe it should become an industry standard, but as such, it would still be an auditing function.

At least the idea might be capitalized as a marketable service to users. But here again, I would caution those users to question the certifiers' qualifications!

In addition, your assertion that "we did have a number of people picked out . . . who could be called 'professionals' " is without merit. You, of all people, should not have to be reminded that the mere fact of membership or officeship in some computer society or the holding of a certificate is no claim to professional status.

Professionalism is gained by adherence to a rigid set of ethical standards, be they written or implied, and by the acquisition of public confidence.

Certainly, we do have some true professionals by the above definition, but we haven't been able as yet to give them the identity and recognition they deserve, which is my point. We still have the task of *people* certification before us. Let the applications documentation take a back seat to this!

D.R. Lister, CDP
Standards Specialist

Springs Mills, Inc.
Lancaster, S.C.

I said that various groups "could" be defined as professionals – not that they should be. See, for example, the ACM New York Ombudsman's definition, "In my book, a professional is someone who gets paid for his work." [CW, April 25, An Obituary on the Fated DP Certification Program]. AT

RPG Does It for 360/20

I must stand and be counted in defense of RPG. The several comments on its being a "Mickey Mouse" language and the creator of "operational nightmares" are not necessarily so. Properly understood and used, it can and does do many things for the smaller DP user.

Perhaps my people are even better than I thought, because we have no such problems as have been described in recent letters. I'm not recommending it for a larger-scale system but for our 360/20 it does it all.

A. Donald Taylor
DP Manager

Robert Packer Hospital
Sayre, Pa.

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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

In Coding, Run Times, Core Used

Benchmarks Show RPG II Beats Cobol

By Don Leavitt
Of the CW Staff

TOLEDO, Ohio – The DP staff of St. Vincent Hospital and Medical Center is devoted to RPG II as the language best suited to its needs. But this devotion is not a matter of blind faith. Carefully planned and carefully documented tests proved RPG II is "one of the most productive commercial languages available . . . significantly superior to Cobol," according to DP director Mike Pauken, CDP.

The tests were conducted about two years ago when St. Vincent converted from an IBM 360/20 to a 360/30. Pauken ran the programming language evaluation to be sure his staff would be using the most efficient language of the several under consideration.

The hospital's approach was to select two specific programs that represented the majority of its commercial workload and to write them in each of the languages being evaluated. The program functions were the same; each had the same number of I/O overlap areas specified and they were run against identical files.

The two programs selected were already written in DOS RPG. Only minor changes were necessary to recompile them under DOS RPG II. Then both programs were rewritten in Cobol by the same individual.

In both cases, the RPG II took less time to develop, to compile and to run than the Cobol, and required less core in the bargain.

Same Results Today?

The tests pitted a fairly early implementation of DOS RPG II against Cobol D. The statistics might be different if the tests were rerun today comparing a current RPG II to ANS Cobol, but the overall result would be the same, programmer/analyst Vern Luse said.

RPG II has matured tremendously, he noted, and now includes niceties such as the FORCE macro and Demand file use that allow the user to break away from the classic prestructured logic of a report generator.

First of the test cases was a program handling three sequential and two index sequential disk input files, a data table for look-up operations and a report to be printed. Program logic included matching two of the files and chaining among three of them. The final output was a census report, Pauken explained.

In this situation, the RPG II took only 16 hours to code and 24 hours to debug, compared to 28 hours for coding and 50 hours for debugging of the Cobol program. Compilation took less than half as long under RPG II and execution took almost a minute less than the five minutes and 19 seconds required by Cobol.

In the first test, the RPG II program compiled in 2 minutes 24 seconds, used 14,455 bytes and ran in 4 minutes 28 seconds; Cobol D compiled in 6 minutes 20 seconds, used 22,988 bytes and ran in 5 minutes 19 seconds. – summary of benchmark results.

The second test program utilized three sequential disk files and cards as input, four sequential disk files and punched cards as output, along with reading and writing from the console typewriter. Program logic involved matching all files and a control break on one field.

This program was to update a detailed revenue file and, at the same time, create temporary files for billing. Again, coding, debugging, compilation and execution times were all lower with RPG II than with Cobol D.

The distinction between RPG II and "old fashioned" RPG was highlighted by the statistics on core usage in both tests, and by the run-time figures in the second. RPG took more core in both situations, and ran 58 minutes compared to almost 27 minutes for RPG II and 29 minutes for Cobol D in the second test.

The programs were run on a 360/30 with 96K bytes of core (all from IBM), 2319 disk drives, a 2540 card reader/punch, and an 1,100 line/min 1403 N1 line printer. Since that time, St. Vincent has expanded to 156K bytes of core, utilizing an add-on from Computer Hardware Consulting Services (CHCS).

Language	Compilation/Run Times (Min:Sec)		Core (Bytes)	Coding/Keypunch/Debugging Times (Hours)			# of Source Statements
DOS RPG	3:36	58:21	25,769	20	3	32	437
DOS RPG II	2:44	26:57	20,921	20	3	32	437
Cobol D	7:16	29:00	22,745	32	4:45	80	964

The results of the second test showed St. Vincent Hospital exactly how well each language had performed and how much effort the DP staff had to put into developing the programs.

'Dass' Uses JCL For Access Rights, Passwords Avoided

SAN FRANCISCO – OS/360 installations concerned about potential security "leakage" caused by casual handling of conventional passwords, can avoid them completely and still maintain a flexible security environment by using the Data Access Security System (Dass) routines from Information Management Inc. (IMI).

In a conventional situation, an IMI source explained, special passwords have to be entered, exactly as prescribed, whenever a user wants to work with a protected program or file. Because the entry has to be precise, he noted, users often carry passwords with them, pass them in an off-hand manner from person to person, or leave them unattended when unauthorized personnel have a chance of finding them.

Dass is based on the IBM-supplied password facility, but rather than working with an external entry, it assembles a "protect code" internally from user-defined but apparently non-security-related characteristics of the subject job stream. After assembling the code dynamically, Dass compares it to a range of acceptable codes and grants or withholds access based on the results of the comparison.

Dass imposes no special limitations on the user. The same range of access possibilities are available with these routines as with normal password operations. Some users or terminals can be limited to read-only access, for example, while others have full creation, updating and deletion privileges on a given file.

Selection of the job stream characteristics to be assembled and the sequence in which they are to be evaluated in the process can be altered by a security officer whenever he feels a leak may have occurred. No new list of passwords is prepared or distributed, however, since the security system is essentially transparent to the user, IMI noted.

Dass algorithms are maintained either through the IBM TSO processor or through a batch protect utility program. In either form, the routines take "no more than 2K bytes of core," a spokesman said. Dass is available for $2,500.

IMI is at 447 Battery St., 94111.

'DD/D' Describes Data on OS Files

WHITE PLAINS, N.Y. – OS/360 users faced with sprawling data files and applications can bring most of the information they need about the files under control with the Data Dictionary/Directory (DD/D) package from IBM.

The package accomodates both narrative and technical descriptions of data, along with facilities for maintaining data integrity and identifying responsibility, data relationships, data structures and application usage. DD/D would be most useful in a manufacturing environment, IBM noted, since it includes a glossary of more than 4,000 manufacturing data element definitions.

One of IBM's Installed User Programs (IUPs), DD/D is described as "especially timely" for users preparing to move to a data base/data communications operation, since the new package introduces discipline and standardization in the management of data. But DD/D is not "automatically" tied in with any particular data base management system, IBM said.

Data descriptions are entered on cards punched according to three preprinted specification sheets. The DD/D will also accept data definitions from Cobol source programs either in card form or from the Cobol library. Any of these descriptions can be modified or deleted later to keep the dictionary current, IBM noted.

From the internalized dictionary, users can retrieve definitions of labels assigned to each data item, record layouts, keyword-out-of-context (Kwoc) listings, alphabetical label list and statistical printouts. Data definition statements, in either Cobol or PL/1 form, can also be punched from the system, IBM said.

The data specification methodology of DD/D contains more than 80 operators, keywords, symbols and coventions for use in developing comprehensive and meaningful descriptions of data.

Core Requirements

DD/D is coded in PL/1 for the F compiler and operates under either OS/MFT or MVT. It requires a 128K partition for the "build and change" programs and 192K bytes for the print function.

As an IUP, it is leased under license agreement for $475/mo, but payments are waived after the first 12 months of use.

Correction of errors in the DD/D logic will be provided without cost to users, but only until this September. No plans for further development work on the package have been announced.

T/S Firm Adds Staff To Work With Users

PITTSBURGH – A Software Services Division has been formed by On-Line Systems Inc. to work directly with users in developing, modifying and enhancing applications, analyzing corporate information requirements and identifying present and future DP opportunities.

The new division will also present courses in programming languages and application of on-line technology and provide consulting services in any area of time-sharing applications. The company provides dial-up service to 16 metropolitan areas in the U.S. and is based at 115 Evergreen Heights Drive, 15229.

'AMS' Includes Data Base Management, Application Design, Coding, Support

DALLAS – Application Management System (AMS) software from Tres Computer Systems Inc. is an integrated application design, programming and documentation system through which OS/360 users can control the buildup and maintenance of large, complex information systems.

AMS includes a formalized structuring of system development functions ranging from design through programming, documentation, decision table techniques and testing. It also has a data base management system to work with complex, interrelated files and a data base language which supports all IBM file and record structures.

A built-in design and programming language (DPL/I) provides a high-level interface between the application systems and IBM's OS, Tres said, and documentation requirements are considered so important to the system that program logic cannot be changed until the supporting documentation is updated.

AMS includes a generalized retrieval and report/file writer system (Tresgen). Users will also be able to access modules written in Cobol, Fortran, Assembly and PL/I, through a DPL/I CALL. Thus coding developed independently of AMS can be included in programs controlled by the system, Tres noted.

AMS utilizes four major systems concepts. The so-called Platform system provides control of operating system facilities in terms of the application environment. It structures the DP interfaces into four skill levels: application system user, application system designer/programmer, software programmer and operating personnel.

The concept of application management integrates data base data and program management into a coherent body of controls common to all applications. The goal of the structuring concept, Tres said, is to modularize programs into logical processing units with specific processing functions.

Finally, the design unit concept is an extension of the structuring concept. Each design unit performs specific data base, data, and program management functions. And each design unit requires specific definitions to integrate it into the rest of the application system structure.

AMS is written in BAL and runs under any of the OS/360-370 options. The minimum CPU model is the same as is required for the operating system under which AMS is to execute.

Tres is at One Lemmon Park Midway, 4255 LBJ Freeway, 75234.

T/S Net Installs 'Watfiv'

NORWALK, Conn. – A time-shared version of the compile-and-go Watfiv (Waterloo Fortran IV) compiler and execution control system has recently been installed on the National CSS remote-computing network.

Watfiv supports "essentially the same Fortran dialect" as IBM's Fortran IV, NCSS added, but the newer system provides more detailed and explicit messages, and diagnoses more errors and violations of Fortran language rules than Fortran "G." Watfiv also supports a set of extensions to the language which speed program development but which are limited to running exclusively under Watfiv.

The Watfiv logic was developed at the University of Waterloo, Waterloo, Ontario, and is available as a batch-oriented OS/370 package from the school's Computer Science Department. The NCSS implementation is the only time-shared version of the system that is currently available, a university source noted.

Spotting Errors

Errors that Watfiv is capable of spotting include use of uninitialized variables, subscripts that are out of range, illegal entries in the range of DO loops, and subprograms redefining constants, expressions, DO loop parameters or ASSIGNed GO TO indices. Without Watfiv, NCSS said, these errors could be very difficult and, in large programs, even impossible to detect.

When Watfiv detects these and other errors, it reports the names of the variables involved, an explicit description of the violation(s), and the location in the source program where the errors occurred.

Free-format I/O without FORMAT statements, CHARACTER data types, and multiple assignment statements are among the language extensions supported by Watfiv. Others include implied DO loops in DATA statements, support for non-numeric subscripts, and the use of expressions in output statement lists.

For Novice, Old-Timer

Both experienced and novice Fortran programmers benefit from the use of Watfiv, the company claimed, since the high compilation speeds and extended diagnostic aids cut debugging time sharply.

The time-shared Watfiv is available through any of the NCSS local offices. The original batch-oriented package from Waterloo University requires a 128K byte 360/370 CPU operating under OS.

National CSS is headquartered at 300 Westport Ave., 06851.

'ISL' Simulates Analog CPU

KENNEWICK, Wash. – Simulation of continuous processes and control and data logging functions can be performed up to 50 times faster on a mini equipped with Interactive Simulation Language (ISL) than on a CDC 6000 series or IBM 360/50 mainframe equipped with standard floating point methods, according to the ISL developer, Interactive Mini Systems Inc.

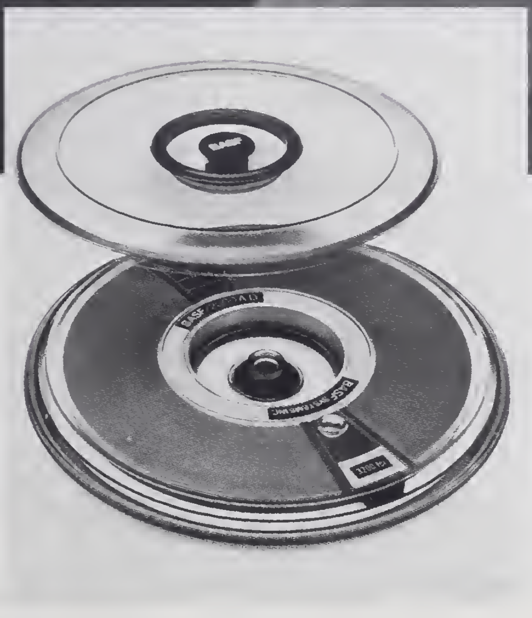
ISL has been installed on the DEC PDP-8 and -12 families of minis, as well as on PDP-15s and Data General Novas. Operating in as little as 4K words of core, ISL is essentially a digital simulation of an analog computer. It includes analog blocks for integration, multiplication, addition, time delay and generation of non-linearities, as well as logical blocks such as GO TO, conditional transfer and relays.

It has many of the same advantages over real analog computers as other simulation languages, but unlike some others, it permits and even encourages interactive participation in the operation by the user. Faster than most simulators, it is still much slower than a real analog computer, the company noted.

The basic ISL for a PDP-8 is available for $2,000. Various functions can be added, generally for $100 each, but "it would be hard to pay more than $3,000" for a completely tailored package, a spokesman said.

The company is at 5312 W. Tucannon, 99336.

People who think this far ahead are thinking BASF/2000 A.D.



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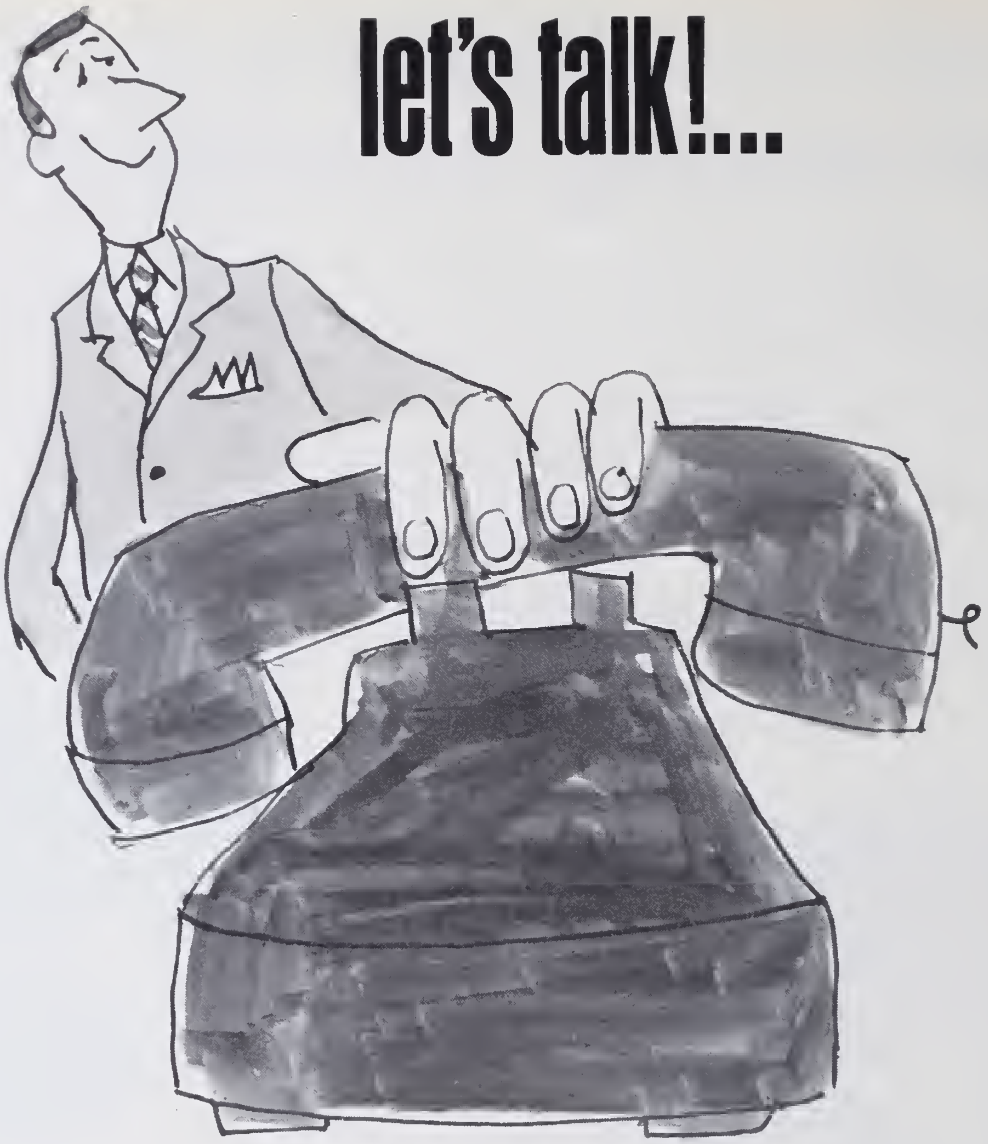

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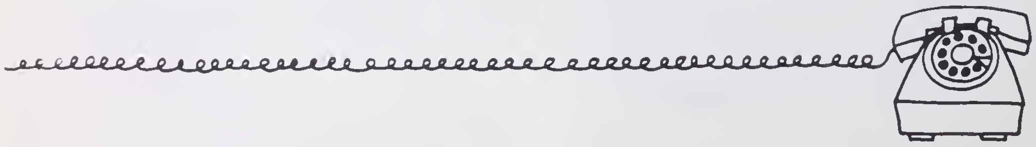

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1973 National Computer Conference & Exposition
June 4-8 • New York Coliseum

Data Briefs

Technical Sessions, Exhibits Included in ICA Conference

BOSTON – The International Communications Association will hold its annual conference here May 13-17 at the Sheraton Boston Hotel.

Among the technical sessions planned are four "case study" presentations by ICA users, and seminars dealing with data communications economics, management and interconnection.

Other sessions will deal with problems of implementing an international communications network, domestic satellites and a discussion on regulatory issues.

More than 100 communications carriers and equipment suppliers will be represented at the exposition which is part of the conference.

Information is available from J.D. Martin at National Steel Corp., 700 Chatham Center, Pittsburgh, Pa. 15219.

Four Terminals Tied To Modem With Multiple Access Coupler

NEWPORT BEACH, Calif. – Collins Radio Co. has a multiple access coupler (MAC) that can connect four data terminals to one modem. The TE-795 has four RS-232 terminal input ports that can direct data to either one or two modems.

A front panel switch enables the user to select the required line, and diagnostic indicators monitor the condition of the line being used. The diagnostics include Request to Send, Data Carrier Detect, Transmit Data, Receive Data and power indicators.

Several TE-795 units can be interconnected to allow an even greater number of lines to use a limited number of modems, a spokesman said. The coupler costs $900 from Collins at 4311 Jamboree Road, 92663. Delivery is four months.

Unit Converts BCD to Ascii

ITASCA, Ill. – The DL 1200 Digilogger from Nationwide Electronic Systems, Inc. converts 10 digits of parallel 1248 BCD data to serial 8-level (11-bit) Ascii code suitable for driving teletypewriters and other Ascii devices.

The Digilogger inputs are strobed and loaded into a buffer memory within 100 nsec of log command which eliminates the need to hold input data constant for scanning, the firm's spokesman said.

At a price of $845 the unit is available from 7N662 Route 53, 60143.

Service Facility Opens in N.Y.C.

SOMERVILLE, Mass. – National Data Industries, Inc. (NDI), an independent supplier of time-sharing terminals and data processing equipment, has opened a branch in New York City.

NDI-Manhattan has service and maintenance facilities for customers.

Novars Tied to 360/30

On-, Off-Line Uses Save $125,000/Yr

By David P. Meade
Special to Computerworld

ST. PAUL, Minn. – A lot of work gets done after hours at the Automotive Battery Division of Gould, Inc. through the use of a terminal communications network. Details of hundreds of incoming customer orders and outgoing shipments flow into headquarters from remote division manufacturing plants, central control records are updated, and current status information goes back to the plants to guide the next day's service operations.

All this activity takes place overnight between a computer at headquarters and unattended data terminals at the plants. The system combines the benefits of online dynamics and off-line economy to assure fast order processing while saving the division over $125,000 a year in direct order handling costs.

The communication terminals – GTE Novar 5-51s – function in off-line mode during the day, recording order, shipment and production data as transactions occur. They also produce needed working documents for plant personnel and simultaneously create a tape record to be forwarded later to headquarters.

Power-typing capability, involving a high-speed search of customer master tape records, reduces order preparation time while virtually eliminating errors. The only new information the terminal operator enters is order number, shipment mode, request date and item quantity.

The search for terminals was launched in December 1970, with the emphasis on faster data transmission between the plants and headquarters, and, just as important, an increase in data entry and transmission accuracy. The system also had to be easy to operate at the plant end, economical and flexible. The decision to install the 5-51s was made in April 1971; the first terminal went into service in July that year, and the system was fully operational at all 12 plants within three months after that.

Transmission speed of the terminals is up to 1,200 bit/sec, and the digitial tape cartridge has a storage capacity of 73,000 characters to accommodate records of the full day's order and shipment transactions at the plants. An auxiliary tape unit makes it possible to power-type data retrieved from customer master tape records while simultaneously recording the data on the transmission tape in the main unit.

Bell Data Access Arrangements link the plant terminals to headquarters via four standard voice-grade Wats lines. The control computer is an IBM System/360 Model 30, with one partition devoted to the terminal transmission function.

In addition to its order handling capabilities, the terminal system provides a bonus benefit to management in the form of more reliable, more current information about what is happening at the remote manufacturing plants.

David Meade is director of information systems at Gould, Inc.

Long-Term, Variable Cost Lease May Be Offered for Bell Units

By Ronald A. Frank
Of the CW Staff

NEW YORK – AT&T may be planning some important changes in the pricing of its data modems, terminals and other equipment.

Instead of the traditional month-to-month rental of its equipment, Bell is considering the introduction of leasing arrangements whereby users would pay a higher initial monthly rate in return for lower payments later on.

The revisions in AT&T equipment rentals are apparently being spurred by increasing competition from suppliers of independent equipment which can be installed in place of carrier-provided units.

Although no firm plans have been announced, AT&T is reportedly considering a 10-year lease under which a user would initially pay between 25% and 100% of the total cost for the equipment. If he paid the full cost initially, the user would save about 35% over straight monthly rentals for the same period.

Also being considered are maintenance options whereby the user could pay an annual prepayment charge. For users who paid ahead there would be a savings over the usual maintenance fee included in each monthly bill. Another option would be a flat hourly rate for Bell maintenance representatives when they are called to a site.

Another option considered by Bell management but rejected for now is outright sale of equipment to users.

All the moves away from traditional month-to-month rentals are an extreme step for AT&T and its operating companies. And before any of the proposals can be implemented, serious regulatory and legal questions will have to be answered.

The phone companies have always had to justify their rates as being fully allocated to cover the costs of equipment and the overhead associated with supplying equipment and service to the user. Lease plans that allow Bell to recover all projected costs associated with equipment for 10 years might not win the necessary approval of regulatory commissions. In addition Bell must live with the restrictions of its 1956 consent decree.

But Bell is becoming much more conscious of customers' costs. Illinois Bell already provides users considering noncarrier equipment with computerized cash flow analyses comparing Bell rentals with independent lease plans.

And another indication that AT&T would like to get more "front-end" money from the user is the trend toward increased installation charges. An example is the new private line, high-density, low-density rate proposal made by Bell [CW, March 7].

Bell is undoubtedly feeling the competition from independent equipment suppliers and impending specialized carriers. In this environment, Bell apparently feels it must get as much money as possible from a user before the customer has second thoughts and begins to consider alternate suppliers.

MCI Using Us to Fight AT&T: PCI

WASHINGTON, D.C. – MCI is using the FCC application of Packet Communications Inc. (PCI) "as another weapon in the MCI-AT&T competitive struggle," according to allegations included in PCI comments filed with the FCC in answer to earlier responses from MCI and others.

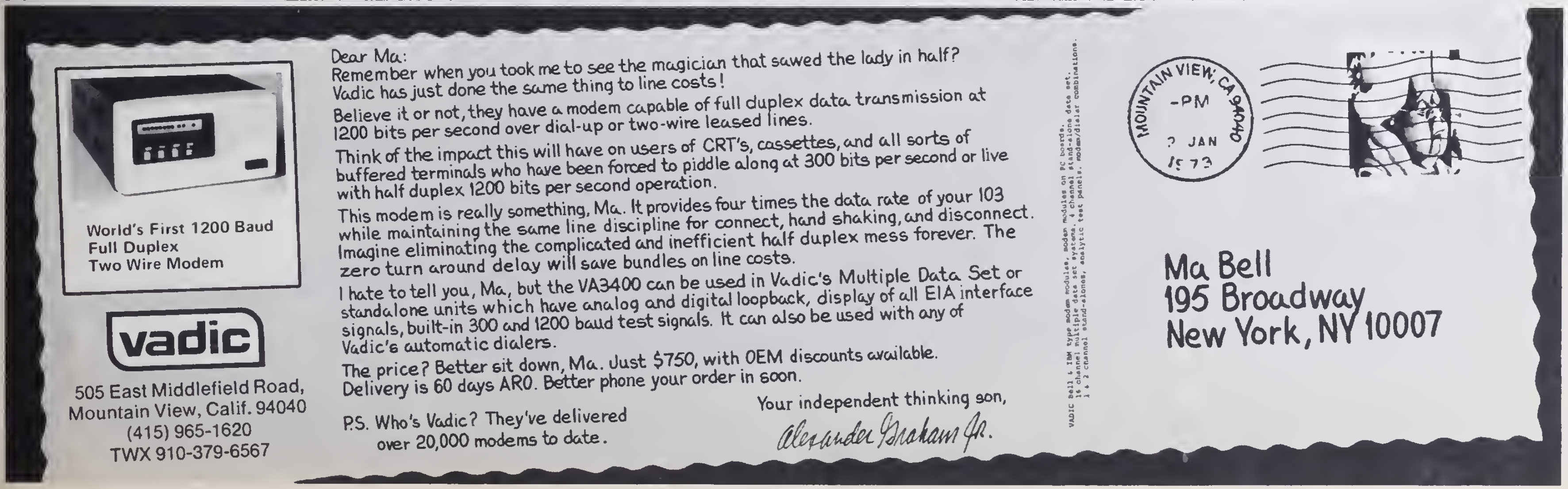
PCI told the commission that it was gratified that its proposal for a packet-switched network [CW, Feb. 7] had met little opposition. The MCI suggestion that an FCC rulemaking procedure on value-added networks was necessary serves only as a delaying tactic, PCI said.

The MCI suggestion was designed to set common ground rules for all value-added carriers rather than allowing Bell to dictate its own terms, an MCI spokesman said. MCI has formed an affiliated company to operate a value-added network [CW, April 11] and the firm welcomes open entry into the field, the spokesman added.

"MCI's obvious purpose is to delay and impede any potential competition for as long as possible," PCI told the FCC.

The PCI application is being considered by the FCC staff which will then make its recommendations to the commission. An FCC staff spokesman said the PCI application will be considered after a recommendation is issued on AT&T's proposal for its Digital Data System (DDS).

The FCC spokesman could not fix a time when it will complete consideration of the PCI application, but a rulemaking procedure could delay the commission's decision, he said.



Communications Panel Agrees:

Support Linked With User's Credibility

KANSAS CITY, Mo. – One of the chief problems a communications user faces in procuring prompt and effective service is establishing credibility with the various suppliers when he has correctly pinpointed a problem with that particular supplier's equipment, according to panelists at a recent communications workshop.

"It took a year until vendors believed my analysis of the problem and then things smoothed out tremendously," observed Bob Kuykendall of Massey Ferguson Inc.

The purchase of a data test set was very beneficial in this regard, he said.

Dick Fioretto, of Panhandle Eastern Pipe Line, said his firm uses Milgo ICC modems with built-in test capability and he always makes sure it "isn't in our own equipment before we call the phone company."

Don Class of the Kansas City Police Department said his solution was to start at the top – with the president of Southwestern Bell and the president of IBM's DP Division. "Then the guys down the line are usually quite responsive," he said.

Terms Differ

Terminology is another area that can create problems when dealing with different vendors, Class said at the Computer Caravan/73 session.

For example, when his department ordered half-duplex lines from Southwestern Bell, it received 4-wire full-duplex equipment, apparently as a matter of policy.

Unfortunately, the department didn't know its equipment was operating in full-duplex mode and when it later ordered and got half-duplex lines from AT&T they couldn't be interfaced with the existing setup. Once the conflict was identified, he said, the new lines had to be reconfigured in full-duplex mode.

To IBM and the telephone company the term "send-receive" has opposite meanings, Class warned. "Ninety five percent of the time when they install a line that's faulty, asking the question 'have you swapped the pairs?' will solve the problem," he said.

Problems can also arise if the phone company changes lines since this may necessitate adjusting data set volumes. Some modems offer automatic volume equalization adjustment, and most users familiar with this area agreed it could often be a worthwhile option.

Class said whenever he called the phone company it would say the line was okay.

But then after IBM comes in, puts a scope on the line, and comes up with some specifics as to the failure in the line, and the phone company is informed of the diagnosis, "they'll fix it," he said.

Part of the problem lies in the fact that the phone company does not seem to be able to put a scope on a user's line because of tariff regulations, he said.

Bits & Pieces

Varian Announces A/D Minicomputer System

IRVINE, Calif. – Varian Data Machines has announced a low-level Analog Input System designed to provide high-noise immunity and a wide programmable range for conversion of low-level analog signals into digital computer format, according to the firm.

For use with Varian 620 and V73 series computers, the Model 620-855 is a self-contained unit which provides an analog-to-digital converter, low-level multiplexer, sample-and-hold amplifier and programmable timer.

Price of the unit with 16 channels is $16,000 from 2722 Michelson Drive, 92664.

Disk System Replaces Nova 4019s

CANOGA PARK, Calif. – Nova series minicomputer users can get a direct replacement for the Nova 4019 disk and control unit from Alpha Data Inc.

Features of the DS-N Disk System include: 256M bit storage capacity; 250 kword/sec transfer rate; 8.4 msec access time.

DS-N Disk System prices range from $4,570 to $20,000 depending on capacity and quantity from 8759 Remmet Ave., 91304.

Moving a Nova On-Line

PALO ALTO, Calif. – The AED 2408 multiplexer, from Advanced Electronics Design, interfaces a Nova computer to eight I/O serial asynchronous terminal devices.

Features include one slot computer I/O board; selectable data rates/channel; channel selectability from five through eight bit/char.; odd/even or no parity bit; and one or two stop bits.

Each channel has its own DMA register to load its starting memory address with an automatic increment of the DMA address register after each I/O operation.

The multiplexer unit is priced at $2,250 from 3197 Park Blvd., 94306.

PDP-11 Users Get Linc Tape

BELTSVILLE, Md. – Linc Tape direct access memory for the PDP-11 minicomputer is available from Computer Operations, Inc.

Included in the system is a Linc tape loader, utility software and a keyboard executive. Transfer rate – via direct memory address – is 8,400 byte/sec and storage capacity is 335K byte/drive.

The basic system provides the capability to read and write on COI 10-track tape. An option, CO-571D, is available for the PDP-11 Linc tape.

Cost of the basic unit is $4,500. The CO-571D option is $850. CO-505 slave units, each providing 335K bytes of additional storage cost $1,700 each from 10774 Tucker St., 20705.

For Fast I/O

Slash 4 Mixes Core, MOS Memories

By Michael Weinstein
Of the CW Staff

FORT LAUDERDALE, Fla. – Datacraft has unveiled a medium-scale computer, the Slash 4, which uses a 24-bit word and offers users the optional ability to mix core and semiconductor memory in one mainframe.

The mixing of memory media allows users to run standard operations with the core memory (cycle time 750 nsec) and use the semiconductor memory portion (cycle time 200 nsec) for fast I/O operations.

In some operations data can be transferred through the faster semiconductor portion with no intervention needed from the central processor, Datacraft said.

As I/O operations become more complex, they can still be routed through the semiconductor portion with needed central processor intervention obtained on a cycle-stealing basis, a spokesman added.

Minimum system configuration is 8K words (24K bytes) of core memory. This is expandable to 256K words, of which 16K words can be semiconductor, the spokesman said.

The basic unit comes with four priority interrupts that can be expanded to a maximum of 48 and one I/O channel with the ability to add up to 24 channels.

Operating Systems

Four operating systems are offered with the Slash 4 including: a resident operating system for simple applications such as process control and real time monitoring; a tape operating system; a disk operating system for batch operations; and a disk monitor system.

The disk monitor system (DMS) has the most expansive features for users, Datacraft said. It is a real-time system providing foreground multiprogramming concurrent with background batch processing. Additional features include spooled I/O, interactive terminal support, dynamic memory allocation, timer scheduled programs and dynamic file creation, the firm said.

Languages Available

Languages available include Fortran, Basic, RPG and Snobol, with overhead software including Forgo (a fast Fortran load-and-go program), an editor program and a macro assembler.

Prices start at $19,900 which buys a basic system with 8K words of memory, parity, hardware multiply/divide/square root, priority interrupt control system, four external priority interrupts, five registers (three for indexing), one 8-bit I/O channel and basic software.

A typical system with disk subsystem and other peripherals will cost in the $70,000 range from P.O. Box 23550, 33307.

Looking Ahead

RCA Demonstrates Laser Memory: Core, Drum, Disk Replacement?

PRINCETON, N.J. – RCA has demonstrated an experimental computer memory, based on laser-holographic technology, which can perform full cycle data processing operations such as write, store, read and erase.

The significance of RCA's demonstration is that laser-holographic memories may be the base of a new generation of mass memories equal in capacity to, but 1,000 times faster than the largest disk systems currently available, according to an RCA spokesman.

"The holographic memory has the potential, when fully developed, to replace the entire hierarchy of core, drum and disk systems now used, and thereby simplify the whole architecture of computers and many other information systems," he added.

Flash Gordon?

In operation, an argon laser beam is passed through two acousto-optic crystals. The crystals deflect the beam in direct proportion to the frequency of sound waves made to pass through them.

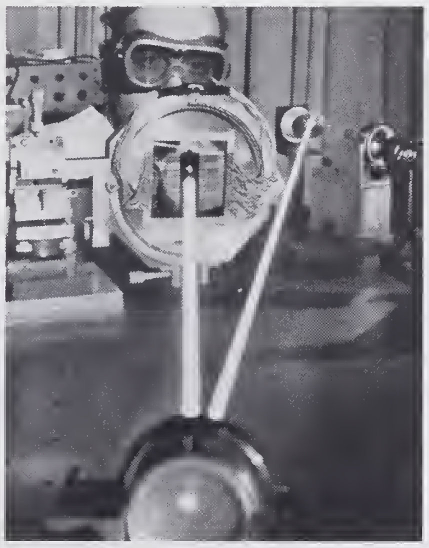
One crystal bends the laser beam from left to right, the other, up and down.

This bending results in 1,024 distinct positions, called "hololens," to which the beam can be deflected. The hololens splits the beam into two parts, one of which goes straight through while the other is diffracted to fall on a flat plane 3 inches square and composed of 1,024 liquid crystal cells.

These cells introduce digital information into the laser beam in the form of tiny areas that are dark or light.

These correspond to the "ones" and "zeroes" of binary code and constitute the data to be written into memory.

RCA's experimental unit comprises 1,024 pages each with 1,024 bits, for a total capacity of more than 1M bits.



A laser beam is used to write, store, read and erase information in an experimental holographic optical computer memory.

HP Unveils Buffered Optical Mark Reader

PALO ALTO, Calif. – Hewlett-Packard is offering users a 300 card/min, internally buffered, serial optical mark reader.

The Model 7260A is a desk-top unit designed for use with terminals, computers or remote data systems through a communications link or direct connection, the firm said.

Data Rates

Data rates are switchable from 110 bit/sec through five intermediate rates up to 2,400 bit/sec.

From one to 80 characters can be read and with the standard 128-character Hollerith character set, the reader transmits the data in 7-level Ascii code.

Price of the HP Model 7260A is $2,975 with lease terms available from 1501 Page Mill Road, 94304.

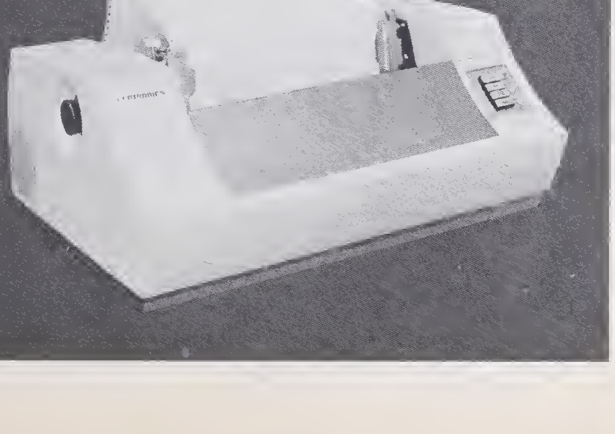
125-, 200 Line/Min Printers Interface Most Minicomputers

DARIEN, Conn. – Minicomputer users can obtain a Tally Series 2000 line printer from Digital Associates Corp.

The 132-column printers – Model 2100, 125 line/min and Model 2200, 200 line/min – are offered as complete systems including all necessary interface hardware, cables, connectors and documentation for the following minis: DEC PDP-8, -11 and -12 series, Data General, Honeywell 316 and 516, HP 2000 series, Datapoint 2200, all others using RS232 communications interfacing.

Options include a 96-character set and serial interfaces enabling the printer to operate as a receive-only printer terminal.

Lease prices start at $111/mo for a complete system, $79/mo for the printer only from 1031 Post Road, 06820.



DATA GENERAL INTRODUCES THE LOADED NOVA.

The loaded Nova is the new Nova 840 and the most comprehensive set of software/hardware capabilities ever available with a Data General computer.

It comes with a built-in Memory Management and Protection Unit that lets you expand main memory to 128K 16-bit words. Base price with 16K of memory is $16,530.

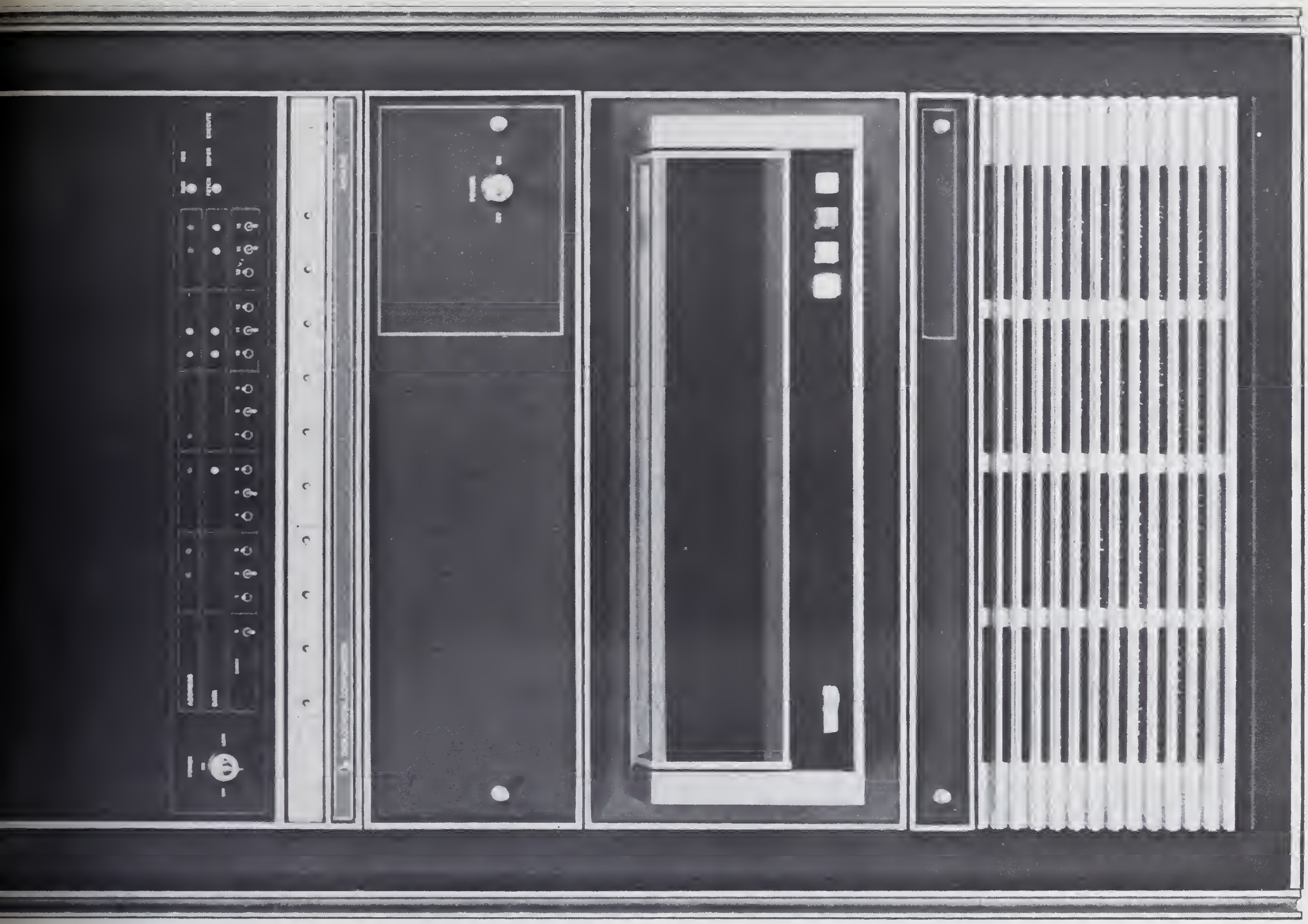
Nova 840 runs a comprehensive Real-time Disc Operating System (RDOS) for dual programming operations.

A new BATCH executive lets you pick your I/O devices, load your jobs, and walk away.

It has our new Fortran 5, Extended ALGOL, Extended Timesharing BASIC, and a whole library of proven Data General software; proven software that we can deliver now.

And our Remote Job Entry software can let the 840 double as a high-powered terminal to a big computer someplace else.

With the right kind of configuration (like the one shown), all that software is available free.



ON YOUR DOORSTEP IN UNDER 90 DAYS.

The Nova 840 in the picture has a central processor with 32 to 64K of main memory, a high-speed Floating Point Processor, hardware Multiply/Divide unit, fast-access disc storage, and 9-track mag tape.

The picture doesn't show lots of the other things you can get with Nova 840: line printers, card readers, Novadisplay terminals, fixed-head Novadiscs, moving-head discs, Nova Cassette tape, communications interfaces.

Nor could we show you the applications and service experience we've developed in the course of building, installing, and supporting over 6,000 Nova computer systems all over the world.

If you're looking for more throughput than you could ever get with a minicomputer, for better access to system resources, at a lower price, call Data General.

Call with an order: we'll put a loaded Nova on your doorstep in less than 90 days.

DATA GENERAL
Southboro, Massachusetts 01772

Interactive Network Unveiled for Graphic Operations

SOUTH WINDSOR, Conn. – An interactive Design System from Gerber Scientific Instrument can allow engineers to work jointly with associates thousands of miles away on particular job problems or to use local computer power to compose, digitize, edit and plot complex mechanical drawings in final form.

Hub of the interactive system is a central processor interfaced to from one to six remote terminals.

Each remote terminal is provided with a satellite process controller capable of supporting one or more local work stations.

Operating capabilities for each work station can be broadly divided into three modes: digitizing, editing and plotting.

While no two of these modes can be operating at the same time, the operator can switch modes at will.

From each remote location (terminal), operations are independent even though they are using the common central processor as the heart of the network.

Hardware

Hardware elements of the interactive system consist of the CPU, disk storage subsystem, magnetic tape cartridge I/O device and teletypewriter at the network center and digitizer plotter, video display terminals, satellite process controller and keyboard/display at the remote locations.

The CPU has a solid-state core memory with a basic size of 12K words, expandable to 33K words (word size is 16 bits).

The disk subsystem is used to store data files and program files for each design terminal as well as libraries of master system symbols and individual terminal symbols used in job definition. Disk capacity is 1.2M words, expandable to 9.6M words.

A standard I/O typewriter unit is provided for system control.

The magnetic tape cartridge I/O device is used for data and program file loading and dumping.

At the Terminal

Each terminal is equipped with its own minicomputer with memory capacity of 2K words. This satellite processor acts to provide program control for local devices and to gather data for the host CPU.

An alphanumeric and function keyboard is provided for each terminal with at least one edit or digitize work station. Forty-eight alphanumeric keys are provided for entry of parameter values and text with 80 encoded pushbuttons provided for entry of system function commands.

An alphanumeric display is provided with a capacity of 80 characters. The display functions to inform the operator of current job state.

The primary means of inputting drawing descriptions is a digitizer with a common drafting machine. The unit allows sketches to be digitized and edited with immediate plotback.

A storage CRT and stylus are available to allow high-speed overview and window-view edit and proofing capabilities.

Software is designed to allow the user to dynamically construct, store, retrieve, manipulate, associate, edit and reproduce information visually or interactively

Also included are all programs needed for the network's operating system and peripheral drivers coupled with graphics packages needed to communicate with a central data base.

A basic system with host CPU and one terminal work station costs about $88,000. Costs vary from that point dependent on the number of remote stations used.

Gerber is at 83 Gerber Road, 06087.

Punchy

IBM employee Ann Nemoede sifts through a pile of nearly two million card chips punched from more than 6,500 cards. This testing procedure is used to test each punch unit of the IBM 3525 card punch.

New OEM Products

(While equipment in this column is primarily for Original Equipment Manufacturers (OEMs), in most cases it is also available in single units to interested users.

Further, while much of this equipment is not presently available as such to the end user, it does give some indication of techniques and products that may be incorporated into end-user equipment.)

Head Upgrades 2314 To 3330 Capability

GOLETA, Calif. – A disk pack recording head with the ability to upgrade 2314 subsystems to 330 subsystem capability is available from Information Magnetics Corp.

The Model R 4400-NT is primarily designed for use in quadruple density 2314-type and cartridge disk subsystems, writing 200 track/in., with a recording density of 4,400 bit/in.

The read/write head has the same flying height as conventional 2314 heads and writes with a track width of .004 in.

Operating frequencies are 1.25 MHz and 2.5 MHz nominal. Output signal is minimum of lmV, and resolution exceeds 50%.

Price is around $500 in low volume OEM quantities from 5735 Thornwood Drive.

Floppy Disk for Minis Out

PALO ALTO, Calif. – A minicomputer-compatible floppy disk subsystem is available complete with one drive, controller electronics, computer interface and software from Advanced Electronic Design.

Storage capacity is 262K character/drive with a transfer rate of 31 kchar./sec.

Price is around $3,000 for a one-drive system with optional extra drives at $1,000 each from 3197 Park Blvd., 94306.

Data Display Uses One PCB

ST. PAUL, Minn. – A 23-in. data display unit, the TD-23, is available from Miratel Division of Ball Brothers Research Corp.

The unit is designed with one solid-state printed circuit board with plug connections to all necessary components. A differential input system is incorporated to minimize hum and extraneous pickup on long cable runs, the firm said.

Additionally, special CRT phosphors and faceplates are available, and TD-23 mounting options include shelf or ceiling yoke hangers.

OEM list price is $425 with volume discounts available from 1633 Terrace Drive, 55113.

Tape Controller Fits Novas

FAIRFAX, Va. – A magnetic tape controller developed for Nova series minicomputer systems is available from C3 Inc.

The controller is constructed on a single printed circuit board which fits into the Nova chassis to provide interfacing and data formatting for up to two Pertec-compatible 9-track, 800 bit/in. tape drives.

The unit can handle speeds of 25-, 37-1/2- and 45 in./sec and provides character parity, character recognition check and logitudinal check on all write and read operations, the firm said.

Other features include read, write, rewind, block skip, erase and search file mark as standard operations.

The controller is priced at $3,500 in quantities of 10 from 2820 Dorr Ave., 22030.

Computer Keeps Cool

CHERRY HILL, N.J. – A.C. Manufacturing Co. has a chilled water cooling system for computer equipment requiring internal cooling.

The system is available in 15hp or 23hp aircooled (glycol) and watercooled systems with computer-compatible compressors, circulating pumps and alarm system.

A.C. Manufacturing Co. is at Old Cuthbert and Deer Roads, 08034.

One-Pass Variable Forms

Computer Married to Printing Press

By Michael Weinstein
Of the CW Staff

NIAGARA FALLS, N.Y. – Users with business forms or direct mail applications may benefit from a new technology that involves the first marriage of a computer with an ink jet printer to produce variable data on standard forms as they pass through a specially equipped printing press.

Previous to Moore Business Forms, Inc.'s development of the one-pass capability, variable forms had to pass through the presses twice – once to print the form and once to add variable information such as name, address, etc.

The first application of this new process was the preparation of tax forms for the Midwest region of the Internal Revenue Service. As the forms were printed with basic information at 700 ft/min, personalized information was added by the integrated computer unit before the completed form came off the press.

The device used to add variable information is built around a Varian minicomputer and an A.B. Dick ink jet printer modified to Moore's specifications.

After the form passes under the ink jet printer, information held on standard computer magnetic tapes is used to direct the printing of 5 by 7 dot matrix characters.

At the current level of development the "Compurite" system is equipped with three print units, each capable of printing five lines of variable information on a maximum of three parts of a form (i.e., a maximum of 15 lines of variable information).

Each line can contain up to 38 dot matrix characters with characters printed in black, red, green or blue. At the present time all characters are printed as capitals.

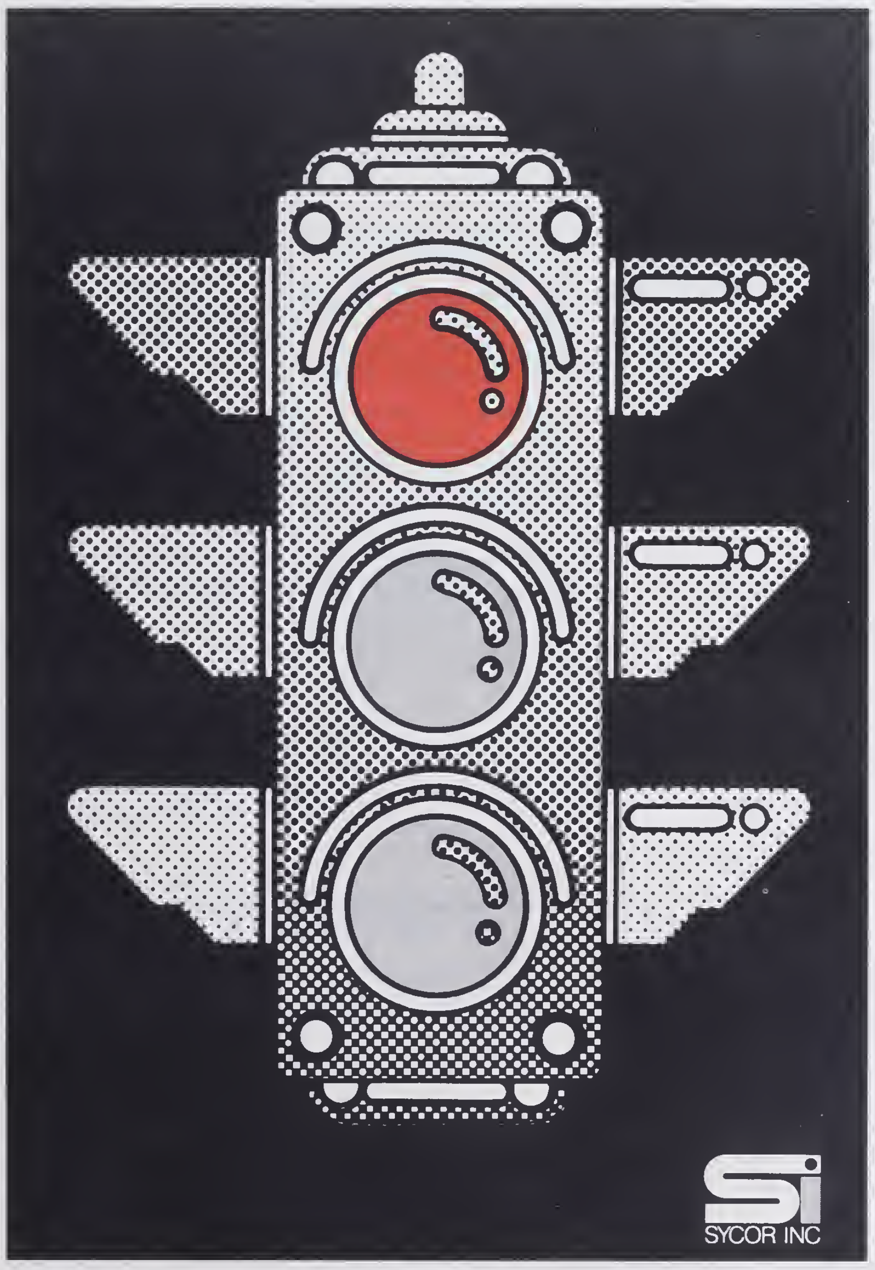
The impact of this system on the $3.4 billion direct mail industry is expected to be immense and Moore said to protect its lead-time advantage it would not quote actual operating specifications or prices.

The only way a user can obtain the Compurite capability is on a service bureau basis from Moore. Moore promises full security of users' tapes and will help with any conversion problems of putting information in a format Compurite can read.

The firm is at 900 Buffalo Ave., 14302.

Report Details System 370

MOORESTOWN, N.J. – A 60-page Datapro 70 report on the IBM System/370 computer line, including descriptions and analysis of all equipment and software announced by IBM through April 1, 1973, is available at $15 per copy from One Corporate Center, Route 38.



Book Describes Microforms

WASHINGTON, D.C. – Users with applications involving microforms can obtain a publication from the American Society for Information Science (Asis) detailing the state of the art.

The book describes the types of microforms available, and discusses the uses, benefits and drawbacks of various microforms.

The Invisible Medium: The State of the Art of Microform and a Guide to the Literature is available from 1140 Connecticut Ave. N.W., Suite 804, 20036 for $3.50 per copy.

System/3-Type Disk Packs Available for Mini Users

TORRANCE, Calif. – System/3-type disk packs are now available from Athana Division of Computer Disc Mastertape Corp., for use with minicomputers utilizing IBM 5440-type drives.

The company claimed the disk coatings were error-free and that the disks carry a standard three-year warranty.

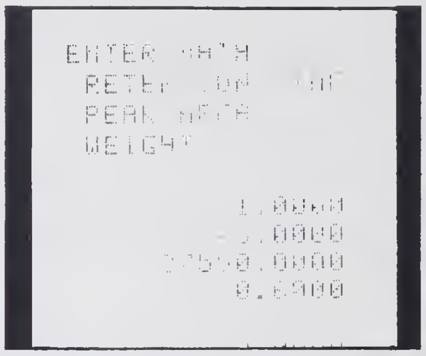
Unit price is $140 from the firm at P.O. Box 3313, 90510.

Calculator Prints In Japanese

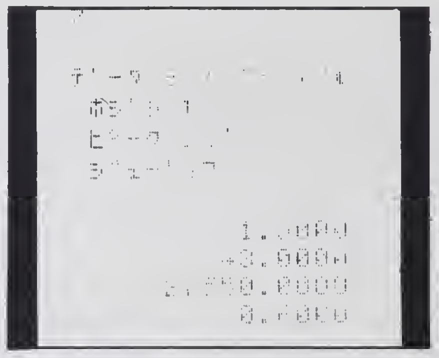
PALO ALTO, Calif. – Hewlett-Packard has developed a special memory for its Model 9810A programmable calculator which enables the calculator to print in Katakana, the Japanese phonetic alphabet.

The read-only memory (ROM) block, developed to adapt the calculator to the Japanese market, permits the calculator to print Roman characters, numerals and various symbols, as well as the Katakana characters in any combination.

The Katakana ROM block is being offered only in Japan. Price is in the range of $600 to $700, depending on the rate of exchange. Hewlett-Packard is at 1501 Page Mill Road, 94304.



Hewlett-Packard Model 9810A electronic calculator prints out paper tape of user instructions and labeled results in English.



The Japanese version of the same instructions is printed by the calculator using the Katakana memory block.

New OEM Products

(While equipment in this column is primarily for Original Equipment Manufacturers (OEMs), in most cases it is also available in single units to interested users.

Further, while much of this equipment is not presently available as such to the end user, it does give some indication of techniques and products that may be incorporated into end-user equipment.)

Impact Printer for Minis

CHATSWORTH, Calif. – Pertec Corp. has introduced a medium-speed impact printer for use with minicomputers and remote terminals.

The Pertec printer has two print speeds – 160- and 300 line/min.

Printer electronics are designed so that a change from the normal 64-character set to a 48- or 96-character set is automatically sensed.

Other features are vertical spacing selection of 6- or 8 line/in., full fault protection, forms handling and adjusting capabilities and disconnect terminals on the power transformer to provide nominal voltage selection from 95 to 250 Vac.

The printer also has optional, plug-in features such as the 12-channel vertical format unit.

The price is $3,990 in quantities of 100 or more with delivery in 30 days. Pertec is at 9600 Irondale Ave., 91311.

Datapoint Joins Centronics Printer

SEATTLE, Wash. – A plug-in interface which connects a Datapoint 2200 with any Centronics printer is available from Keywrite Corp.

Circuitry is contained on one printed circuit board which fits inside the printer and requires no installation modifications.

Operationally, the interface receives a parallel 8-bit input from the Datapoint 2200 and transmits the data in parallel to the Centronics printer.

Interconnecting cables are available to fit user requirements, the firm said.

Base price of the interface is $350 with volume discounts available from 1200 N. 107th St., 98133.

Display Provides 6-Digit Read-Out

ITASCA, Ill. – A remote display unit, Slimline Remote Display, is available from Nationwide Electronic Systems, Inc.

The unit provides up to six digits of .270 in.-high LED readout from any TTL/DTL source of parallel 1248 positive true BCD data.

Cost ranges from $149 to $155, depending on digit-design and digit-requirements. Delivery is about 20 days from 7N662 Route 53, 60143.

Tape Unit Handles 75 Char./Sec

CARLSTADT, N.J. – A 75 char./sec paper tape punch has been introduced by Litton ABS OEM Products Division.

Available in desk top or rack mounted models with or without IC electronics, the Roytron 700 Series handles 5-, 6-, 7- or 8-level code.

Features include positive detent stop, tape tear knife, tape hold down, tape drive sprocket, punch cover and timing generator. All units are available with discrete negative logic or positive logic.

Unit price is $507 with OEM discounts available from 600 Washington Ave., 07072.

British Punch Available in U.S.

MIDDLESEX, England – Data Dynamics has announced the availability of its 1130 Series paper tape punches for U.S. OEM buyers.

The 1130 Series operates at speeds of up to 46 char./sec and is offered in either synchronous or asynchronous models.

Other versions include free-standing units with or without tape handling, and options such as echo check, edge punched card perforation, variable tape guide and desk mounting.

Prices for the 1130 units start at $444 through Data House, Springfield Road, Hayes, Middlesex, England.

Societies/ User Groups

38 Technical Sessions

NCR Meeting Features Product Preview

SAN DIEGO, Calif. – NCR users gathering at the annual meeting at the Sheraton Harbor Island Hotel here May 14-16 will get a preview of some future products as well as a selection of 38 technical sessions.

A session on "Taxes on Computer Software" will be given by Joseph Frascella of Systems Development Corp. on May 16.

"Prospective Medicine," a means of identifying potential health problems through the use of the computer, will be discussed by Dr. Charles Roos of Inter-Health. Stephen L. Priest of the Brockton, Mass., Hospital will outline a method of "Using Routine Hospital Data in Administrative Decision-Making."

For those interested in computer operating costs, Dr. Laird Sloan of Automated Systems Corp., Houston, will discuss the "Incremental Costs for an On-Line Data Collection and Communications System."

Representatives from NCR will lead some of the sessions, and William S. Anderson, president, will keynote the opening meeting May 14. Users may also visit the NCR DP division headquarters and new manufacturing plant at Rancho Bernardo.

"User Responsibilities" will be discussed by Stephen Loewy, NCR assistant vice-president, systems services, and recent and future trends in software development will be outlined by William P. Keating, NCR assistant vice-president.

Carl Cutright, also of NCR, will explain NCR's computerized inventory management system, and Dave Glick will speak on "optimizing production scheduling."

Attendees will be given a first look at "Documat," NCR's forthcoming computer-assisted documentation system, plus a preview of some future software releases, such as Release 8B.

Manual Government Systems Unfair, Davis to Tell GMIS Users

JACKSONVILLE, Fla. – Governments that fail to use computer-based systems perform an injustice to the public interest and cannot fulfill their public service obligations, according to Dr. Ruth M. Davis, Director of the National Bureau of Standards, Center for Computer Sciences.

Davis will be expanding on this theme as the keynote speaker for the Government Management Information Systems (GMIS) Users' Group, at its annual meeting here May 15 and 16.

The GMIS users must assume a large responsibility in bringing automation as a technological partner of good government to the attention of national leaders, she said.

Also scheduled for the meeting are two panel/workshops. The Wednesday session is titled "Project '73 – Administrative Regulations for Security and Confidentiality in State and Local Government Data Centers." It will deal with the issue of shared versus dedicated computer systems.

"Project '74 – Computer Independent Data Management Software" will be the topic for Thursday's session, focusing on the need to accomplish transferability of systems.

In addition to the panel/workshops, several sessions dealing with current topics in municipal data processing are scheduled.

Details of the conference can be obtained from Masaji S. Toki, GMIS secretary-treasurer, 138 E. Court St., Cincinnati, Ohio 45202.

Graphics Group to Emphasize MIS, Composition, Mail Applications

TORONTO, Ont. – The seventh annual Graphic Communications Computer Conference May 23-25 offers users in the graphic arts a choice of programs on composition, mailing lists and management information systems using computers. The conference will be at the Sheraton Four Seasons Hotel.

In the composition program, topics range from information storage, retrieval and composition to conversion to OCR and input integration. Other sessions will examine blue sky in software, time-sharing composition input and data base management and composition.

The MIS section of the conference covers such topics as management information and company growth, production loading, scheduling and control, and maxisystems from minicomputers – a case study.

Sessions on the mailing list services and delivery system developments will look at Canadian and U.S. postal services and their implications in list maintenance. The trend to route sequencing will also be examined.

There will also be several tours of local plants which use computerized lists and composition systems.

For non-members of the Graphic Communications Computer Association the fee for a single registrant is $150; for members $100. Discounts for multiple registrants are available. The association is at 1730 N. Lynn St., Arlington, Va. 22209.

ACM Names Bachman Turing Recipient

NEW YORK – The Association for Computing Machinery has named Charles W. Bachman of Honeywell the recipient of the 1973 A.M. Turing Award for his outstanding contributions to data base technology.

Bachman, the inventor of Data Structure Diagrams, has been the principal architect of the Integrated Data Store data base management system.

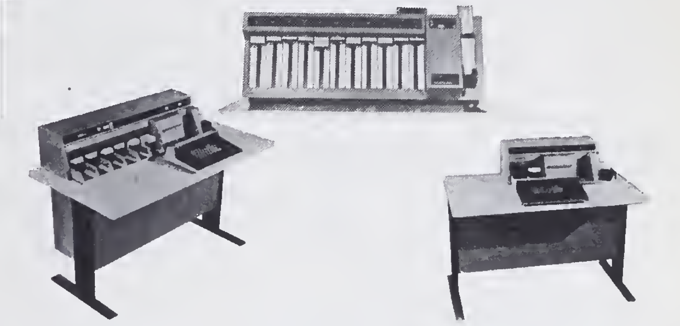
The award will be presented at the ACM conference in Atlanta, August 27-29.

IEEE Sponsors Awards

SILVER SPRING, Md. – The IEEE Computer Society Governing Board has voted to sponsor the awards in Mathematics and Computers at the International Science and Engineering Fair in San Diego, Calif., May 6-12.

In addition to sponsoring the awards, the society will provide judges in the mathematics and computer category.

The society hopes this step will strengthen its present and future student participation.



EDP Auditors 'Come of Age'

SANTA MONICA, Calif. – The 1973 EDP Auditors Conference June 7-8 at the Miramar Hotel here, will focus on "EDP Auditing: A Coming of Age."

The meeting will consist of two series of sessions, one on management and the other on technical aspects of auditing.

"EDP Auditing Perspectives: Internal versus External" and "EDP Auditing's Role in the Management Function" are topics scheduled for the management series. Other sessions will deal with personnel selection and training, and the development of standards.

The technical sessions will examine performance measurement techniques, controls in data base and telecommunication environments, and the evaluation of documentation.

Cost for association members is $45; non-members, $55. Registration deadline is May 23. For additional details, contact Dick Ryan, EDP Auditors Association, P.O. Box 15562, Los Angeles, 90015.

Bankers to Examine Systems, Operations

CHICAGO, Ill. – A wide-ranging program embracing both systems and bank operations has been planned for the 1973 National Operations and Automation Conference sponsored by the American Banking Association. The meeting will be held here June 4-6 at the Palmer House.

In addition to 54 sessions highlighting current bank operations and DP topics, there will be seven workshops, as well as small special interest sessions and opportunities to discuss experiences with others who have the same responsibilities in similar-sized banks.

An in-depth examination of the changing payments system will be provided through a workshop and several special interest sessions.

Session topics range from "what the manager needs to know about future changes in DP technology and techniques for improving systems and programming productivity," to multilevel looks at OCR and COM.

One of the seminars for large banks will examine evaluating automation alternatives – facilities management, joint ventures, correspondent services, service bureau or in-house development.

Virtual memory, application software selection, and lessons learned in the implementation process are topics of other first-day seminars.

Societies/ User Groups

Special interest sessions on Monday will treat areas such as COM, large bank customer information files, modularity in applications programs, remote processing, on-line teller terminals, minicomputers and multiprogramming costing.

Reject Items

A Tuesday session on reject item processing will evaluate the possible alternatives – OCR, add-on strips and on-line CRTs. Other sessions will examine use of simulation in bank planning, fundamentals of DP planning, data entry and embezzlement by computer – the extent of the problem, case histories, why it happens and what can be done to combat the problem.

The Wednesday workshop on the change of payments system will cover the reasons for change as well as the nature and implication of current changes.

Other related sessions include a status report on a national payments system covering automated clearinghouses, point-of-sale systems, bank cards, a review of Atlanta's implementation of a regional automated clearinghouse and magnetic tape accompanying clearing checks.

Another Wednesday workshop focuses on "user department relations – the DP manager's Achilles heel." Primary emphasis will be on assessing systems tried in various banks.

In "Scenario-78" attendees will get a look at what banking may be like in five years.

Conference registration fees are $130 for bankers and $160 for non-bankers, which includes three luncheons and two evening receptions.

For registration materials, write the meeting registration coordinator, The American Bankers Association, 1120 Connecticut Ave., N.W., Washington, D.C. 20036.

Users to Review Financial MIS Projects

NEW YORK – The Society for Management Information Systems' Spring conference will convene at the New York Hilton May 10-11, preceded by preconference workshops on May 9.

Two concurrent workshops will center on financial management information systems and ingredients of successful MIS project management. Emphasis in the financial session will be on the conceptual design of financial information systems for decentralized management.

Conclusions from a study of 20 information systems development projects in 10 large firms will be reviewed in the workshop on successful management.

The fee for the workshops is $75 for members, $105 for non-members, who will also receive membership in the society for one year.

During the conference there will be a repeat of two presentations from past annual conferences, the Westinghouse Story and the International Utilities Story.

The conference fee is $175 for members, $205 for non-members, which includes annual dues.

The Society for Management Information Systems is at 221 N. LaSalle St., Chicago, Ill. 60601.

Calendar

May 13-16, Denver – Association for Systems Management, 1973 International Systems Meeting. Contact: R.B. McCaffrey, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

May 13-17, Boston – International Communications Association Conference. Contact: J.D. Martin, Jr., National Steel Corp., 700 Chatham Center, Pittsburgh, Pa. 15219.

May 14-15, Arlington, Va. – Washington Chapter of Uaide (Users of Automatic Information Display Equipment) Meeting. Contact: Uaide, c/o Datagraphix, 7315 Wisconsin Ave., Bethesda, Md. 20014.

May 31-June 1, London, England – International Exposition for the Minicomputer Industry sponsored by the Polytechnic of Central London. Contact: Lisa Spaducci, Polytechnic of Central London, 115 New Cavendish St., London W1M 8JS, England.

Multimedia Instruction Plan Features Self-Determined Pace

WELLESLEY HILLS, Mass. – Multimedia instruction in data processing is now available for individual learning through a self-instruction package from Honeywell Information Systems.

This package combines programmed texts and flipbooks with film strips and cassette tapes and is called the "Self-Instructional System of the Seventies."

The basic course material is essentially generic, and the knowledge acquired can be used with any computer, according to Honeywell.

The learning programs are designed to educate the data processing trainee in the basic concepts of computer programming on an individual basis. Although they require no instructor assistance other than exam grading, administrative guides are provided to help implement the program in schools, colleges and corporations.

Each student may begin a course at any time and proceeds at his own pace in an interactive environment involving reading, listening, observing, responding and reviewing. Programmer training requires from 120 to 150 hours of learning on a full-time study basis.

At the end of each course the student is tested and evaluated against national standards on his understanding of the material.

The administrator's kit combines audio and visual aids, the examination answers and a guide that directs the administrator in the use of the audio-visual package.

The administrator supplies the audio-visual aids and instructs the student in their use. These aids include film strips, audio cassettes and, for some courses, flipbooks. The administrator then monitors student progress and grades progress examinations.

Education

The eight self-instruction programs now available are Fundamentals of Electronic Data Processing, Programming Logic, Basic Cobol, Tape Cobol, Disk Concepts, Disk Cobol, Advanced Cobol and Introduction to Series 200/2000.

Two data-entry courses are also offered for Keytape and Keyplex Operator Training. The data entry courses contain texts and audio cassettes designed for use at Keytape or Keyplex machine stations that provide hands-on experience during training.

Cost of the administrator's kits range from $95 to $195. The student texts range from $7.50 to $22.50.

The audio-visual hardware unit for a one-time purchase price of $195, includes a self-contained, rear-screen film strip projector and audio tape cassette player. The audio system has a built-in speaker for group listening and a jack for use with the hi-fi type headphones for private listening. The number of units required is determined by the number of students using the system at one specific time.

The Honeywell education center is located at 110 Cedar St., 02181.

Data processing trainee progresses at her own pace using programmed text and audio-visual self instructional system developed by Honeywell.

DP Goes to Church

NEW DUNDEE, Ont. – A Lutheran pastor sees the computer as "one of God's little helpers" for its capacities as financial advisor. The St. James Lutheran Church here is leasing a computer which lets the church council know if monthly budgets are being met and also gives each member a statement of his yearly contributions for tax purposes.

Control Data Graduates Qualify for College Credit

MINNEAPOLIS – Computer technology graduates of Control Data Institute will be able to apply their training towards a degree at St. Cloud (Minn.) State College under terms of an agreement just completed by the college and the institute.

Institute graduates will be able to transfer as much as 30 quarter hours of credit to the electromechanical technology program in the college's School of Industry, according to Dr. Robert Ryan, chairman of St. Cloud's technology department.

Drake University To Offer Major In DP Management

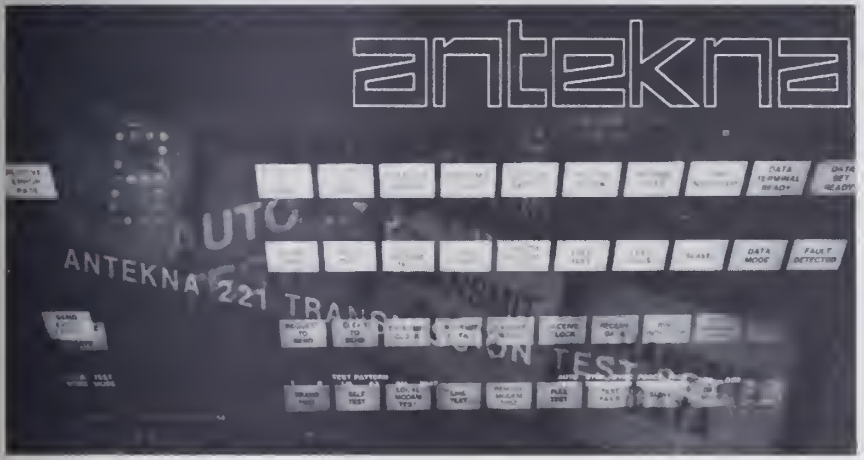
DES MOINES, Iowa – Drake University will offer an undergraduate major in computer information systems management through its College of Business Administration, beginning next fall. One objective of the new curriculum is to prepare students for the Certificate in Data Processing (CDP) examinations sponsored by the Data Processing Management Association.

Management Studies Included

The new program is principally intended to get students ready for positions in DP management and systems analysis. It tempers classic computer science courses with studies in principles of management, and systems analysis and design so that graduates will have an appreciation of business problems as well as DP.

While the new program is the first at Drake to focus principally on DP, students in all curricula run by the College of Business Administration have been required to take at least an introductory course in DP. The school even grants "foreign language" credits for work done in Cobol or Fortran, a spokesman noted.

The university has a Honeywell H1200 which is available for student use.



DP Diagnosis Debugs 'the Bug'

Volkswagen of America has turned to computers to get the bugs out of "the bug."

Computer Diagnosis, the car dealer's check-up system, uses sensors built into all late-model VWs to make up to 72 checks on a car's performance. These include such tasks as checking front-wheel alignment, ignition performance, engine compression and the electrical system.

To perform the checks a digital system designed by Siemens A.G. of Germany is connected to a central socket in the engine compartment. A program card runs the tests in sequence and results are analyzed and printed out in 20 minutes.

Under a services and maintenance contract with Honeywell's Test Instruments Division, the system is being installed at 12,000 VW dealers.

Divided Workloads, CAI Speed Compensation

By Bob Wright
Of the CW Staff

SALEM, Ore. – An unusual concept coupling specialized teams with computer-assisted operation has resulted in increased efficiency and better control for the Oregon State Accident Insurance Fund (Saif).

Used in Saif's claims operations, the Claims Director System (CDS) calls for a team-specialist approach to speed the handling of workmen's compensation cases. The team includes an employment specialist, insurance-legal specialist, medical specialist, computer data control clerk and unit clerk.

Divided Workload

Before CDS was in operation, each claims adjuster was responsible for controlling all of the aspects associated with a claim. The CDS concept, by dividing the total workload, allows the adjuster to concentrate his attention and effort on the claimant.

Ralph Faulkner, DP manager for Saif, explained that the organizational structure around the hardware and software enables CDS to spot rehabilitation needs and anticipate problems that could later complicate a claimant's recovery. "The payoff," Faulkner added, "is in getting the man back to work earlier."

Through faster and more personal claim service, CDS also reduces the chances for psychological barriers to develop which interfere with a worker's rehabilitation.

CDS uses a customized Nova 1220 with two disk drives, one for programs and claimant records and another for backup. Faulkner said the Nova, hardware to drive the CRT display, and the software were all developed by Insurance Technology Inc., Berkeley, Calif. A 150 char./sec printer completes the system.

Faulkner noted that CDS can realistically handle 1,300 to 1,400 claims, although the stated capacity is 2,000. "Cost," Faulkner added, "is about $50,000 annually, which includes hardware, software, concepts, techniques and training."

Checkless Society 'Here Now'

COLUMBUS, Ohio – Money is a thing of the past – at least for some residents of this city.

After a nine-month experiment City National Bank & Trust Co. is now installing a computer system which will allow its customers throughout the area to buy virtually anything with a single credit card.

A checkless system has been tried before in other cities, but at least one foundered in part through lack of customers. This problem does not seem to affect the Ohio scheme – thirty businesses, including supermarkets, pharmacies and department stores, have signed up to participate.

Store terminals are linked by phone lines to a master computer at the bank, permitting the salesman to verify and record a sale in seconds. Customers have the option of charging the merchandise and being billed at a later date, or of paying for it directly from their checking accounts.

The checkless system cuts down on paperwork for the bank, and protects the store since the computer rejects the sale if the customer has insufficient funds or if the card is stolen.

"Everyone has talked about a checkless, cashless society," says bank chairman John G. McCoy. "They said it would be here 10 years from now. We think it's here today."

Ace Bill Collector Gets the Alimony

PORTLAND, Ore. – Harold C. Hart is Oregon's No. 1 bill collector. And what he collects are overdue payments of alimony and child support.

Aided by his computer, Hart, working for the district attorney, collected $10.9 million last year alone. His "victims" are the delinquent among the 19,000 fathers whose names spin in the Multnomah County computer file.

All child support and alimony orders are stored in the computer and a bill is automatically sent out to the father. If no payment is received within 30 days of the due date, the computer sends out a reminder note and waits 30 more days. Then, if the account is still unpaid, the computer marks the case for prosecution.

Last year, some 210 "foundering" fathers were "turned in" by the computer.

'But Ours Are Cuter'

BIRMINGHAM, Ala. – Personalizing computers may be a big problem for some banks, but not for the First State Bank of Altoona. In fact, they boast not only personalized service, but advertise "cuter" computers.

The secret of their service is indeed personalized computers – two women who do all the bookkeeping.

"It's just not economically feasible for us to have computers now," says Jack Ray, bank president. "We have little or no turnover in personnel, so our bookkeepers know the customers, their habits and their technique of banking."

The fact that some First State customers sign their checks with an "X" probably has a lot to do with it too, he said.

Aussies May Store Legal Data

CANBERRA, Australia – The Federal Government has set up a committee to examine the use of computers to store legal information. The government hopes to transfer all legal data on federal statutes to computers to make information more readily available.

CI Notes

Cary Sees Business Up

SEATTLE, Wash. – IBM is expecting improved business this year, President Frank T. Cary told shareholders at the recent annual meeting. "We expect relatively strong economic conditions in virtually all major countries," he said.

The firm plans to hire about 20,000 persons this year, half of whom will be based abroad, he said.

At the meeting, stockholders approved a five-for-four stock split.

Shipments of DP equipment for the year "are expected to be at a high level, with several newly announced System 370 products scheduled to be delivered in increasing quantities as the year progresses," Cary said.

Comma, CHCS May Merge

NEWTOWN, Pa. – A merger may be in the offing for Comma Corp. and Computer Hardware Consultants & Services, Inc.

The boards of directors of both firms have approved an agreement providing for the merger.

DPF to Replace Air Force 360s

HARTSDALE, N.Y. – DPF Inc. has received a contract from the Air Force to replace six IBM 360/40s, 75 IBM 2400 tape drives and other equipment, with a total IBM purchase price of about $5 million.

Under a previous award, DPF will also supply the Air Force with a 360/75.

Supershorts

The Social Security Administration has ordered 70 1302 key-to-disk systems from Inforex, Inc., for a total of 851 keystations. The units will be delivered this year, according to Inforex. The contract allows the government to increase the total order by about 50%, the firm added.

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Peripheral Sciences, Inc. has named Dasa Corp. as sales and service representative in the major metropolitan areas of the U.S.

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Applied Data Research, Inc. has established ADR International Corp. as a wholly owned subsidiary to direct the firm's growing world trade activities.

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Advanced Memory Systems, Inc. has received a contract from Telefunken Computer Gmbh of W. Germany for the design and manufacture of 128K word by 59 bit MOS memory systems. Telefunken will convert its Model 440 computer from core to MOS memory with shipments starting this fall.

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Brother International Corp. recently delivered the 10,000th printer assembly to Centronics Data Corp.

Documents Indicate:

IBM Studied Profits, Discounts on FTP

By E. Drake Lundell Jr.
Of the CW Staff

TULSA, Okla. – IBM almost gave its users a larger discount on equipment when it announced the fixed-term lease plan, but apparently the larger discount was unacceptable to the firm's lawyers and economists, according to confidential IBM documents released here.

It also appears from the documents that IBM carefully planned in May, 1971, which devices would receive the price reductions and which would not.

IBM's data processing group initially recommended a 10% reduction for 12-month leases and a 20% discount for the 24-month lease plans.

At the same time, the firm's lawyers recommended a plan that would give users a 10% discount for an 18-month lease and a 20% cut if the user would sign up for 30 months.

It was determined, the documents showed, that the " convergence point" of the two plans would be an 8% discount for a 12-month lease and a 16% discount for the two-year leases – and that was the plan that was finally announced.

Only Certain Products

In the briefing plan drawn up on May 18, 1971, just about a month before the plan was announced publicly, there were lists indicating which products would be in the plan and which would not.

The documents show IBM originally planned to reduce lease prices on all printers, tape units and controllers, and disk drives and controllers.

No reason was given in the briefing plan for excluding certain products, but testimony in the Telex-IBM case indicated that the products included in the plan were those with competition from independents, and the ones left on the 30-day lease plan were those that had no competition.

The documents seem to support this contention. The documents show for example, that IBM charted where the reductions would place its equipment in comparison with what else was available in the market.

In the area of three-spindle 2314 configurations, IBM noted that its present price was $2,480/mo compared with the plug-compatible manufacturers' average price of $2,260/mo.

The reduction for a one-year lease brought the IBM price down to $2,282 monthly, while the two-year 16% reduction lowered the price further to $2,083/mo, under the competition.

Long-Term Benefits

IBM also charted the effect of the fixed-term plan on its own revenues before going ahead with it and found it would be beneficial in the long run.

In the disk area, for example, the IBM plan estimated that during the 1971-76 time span the fixed-term plan would generate additional revenues of $52.1 million on the 2314/2319 type of disk drives by preventing that many from going to the competition.

IBM also estimated it would lose $17.1 million over the same time period, by applying the plan to 2311s, but this would more than be made up by additional revenues of $57.2 million expected from long-term leases for the 3330 unit.

So while the firm estimated the plan's effects would cost it some revenues in 1971 and 1972 before the 3330 was on the market, the researchers said over the long run the firm would pick up $61.9 million on the disk line more than it would have without the plan, apparently because it would keep users in the IBM fold who normally would have gone to the independent devices.

In the card equipment area, however, the analysis turned up long-term losses instead of gains if the fixed-term lease was applied. The researchers found IBM would lose revenues of $106.2 million if the plan was applied to the 2540 card reader/punch and to other System 360 I/O gear over the 1971-76 time span.

In addition the firm estimated the profitability of the 3505 Card Reader/Punch and the 3525 Controller would slip from 25.1% of revenues to only 18.9% of revenues if the fixed-term plan were applied to the card I/O gear.

However, the firm might have a surprise in store for card equipment users since the report noted IBM "could do a card I/O price increase on own merit regardless of FTP."

In addition, the researchers said the firm should not "do FTP on System/3 I/O gear" because of profitability reasons and because such a long-term "lease" plan in the System/3 area might "slow migration within the system."

Exhibitors Cite Caravan /73 Sales

By a CW Staff Writer

NEWTON, Mass. – "Based on a 40% increase in exhibitors and a 50% increase in attendance," said Neal Wilder, sales and marketing director for the Computer Caravan/73, "we expect the exhibitors will double last year's sales total of $25 million." The Caravan recently completed its nationwide 10-city tour.

A random sampling of the 52 exhibiting companies confirmed Wilder's expectations, with most of the firms claiming the investment in the Caravan had been cost-justified before the tour was one-third complete.

John Cullinane, the president of the software firm that bears his name, said one sale justified his expenditure of the $15,000 for a single booth.

Cullinane is the software representative on the Caravan Advisory Panel, a seven-member group established early this year to help plan the user forums, select sites and cities, and promote the entire program.

Other members include representatives from Iomec, Inc., General Computer Systems, Lockheed Electronics, Univac, ICC/Milgo and Ampex.

Avery Blake, vice-president of marketing for Iomec, noted his firm had "a $7,000 sale within a half hour after the show opened in Boston."

Dallas Talley, vice-president of marketing for General Computer Systems, noted his firm had a $150,000 sale to a user who never heard of us.

Many of the exhibitors sent representatives to sit in on the panel discussions and workshops, to "hear what users are doing, and their attitudes, and/or evaluations of that which they have experienced," according to a supervisor for AT&T.

CDC Splits DP Into 3 Companies

MINNEAPOLIS, Minn. – In a realignment of management, Control Data Corp. has split its computer operations into three separate companies within the corporation.

The move places operating responsibilities with a seven-member management committee, Chairman William C. Norris explained.

The firms are: Control Data Systems & Services Co., Control Data Peripherals Products Co. and Control Data Marketing Co.

The new president of the units are: Robert M. Price, Thomas G. Kamp and Paul G. Miller, respectively, who were formerly senior vice-presidents. Each will be a member of the new management committee.

With the new arrangement, Norris "will be able to devote much more time to planning and to growing relationships with other organizations, both in the U.S. and in other countries.

In other areas, Control Data has indicated the DP services business of the Central Information Processing Corp., a subsidiary of CDC's Commercial Credit Corp., will be absorbed by the newly acquired Service Bureau Corp.

On the international front, CDC confirmed it has engaged in trade discussions with the Soviet Union. "We have made proposals to them and we are making progress in these discussions," a spokesman said.

Survey Indicates

Communications Industry Should Help Educate User

By Molly Upton
Of the CW Staff

KANSAS CITY, Mo. – Communications users and industry representatives agreed in a recent survey here that more education and delineation of communications capabilities and foibles are needed in order to advance the level of communications use.

"The industry should be more responsive to the user and provide the facilities he needs," commented Dick Fioretto of Panhandle Eastern Pipe Line.

He observed that the communications capabilities of the dial-up networks should be improved, and said users need more economical systems. Perhaps a dedicated system throughout the country would provide this, he added.

Who Should Help?

"Users need help, but I'm not sure it should necessarily come from the industry," commented Dave Nordlund of the University of Kansas. "Users need a good handle on the kind of service that will supply their needs."

For example, he said, they need more information on data rates, code sets and how to assess their future equipment needs.


Dick Fioretto

"Perhaps some sort of book is needed detailing theoretical case histories involving selection of equipment for particular needs," he observed.

"Users need to prime their intuition. Some aspects are not obvious. For instance," he pointed out, "the most economical units may be inadequate for the system when it is upgraded.

"There are too many factors in selection and use. It's like raising a kid. You often don't know if you've made a mistake until it's too late."

More Comparisons

George Plofkin, a programmer for the Omaha Public Power District, said he would like to see more comparisons of specifications such as transmission speed.

Plofkin is a time-sharing user and he said he thought T/S firms should publish throughput specifications.


Dave Nordlund

"Right now a user feels like he's facing a used car salesman" when talking with vendors of different systems, he said. "It's very hard to evaluate them," he added.

From the industry side, John Roush, central regional accounts executive for ICC-Milgo, said, "The industry should educate the user more," and should offer reliable equipment and service.


Bob Smith

In addition, equipment should be built with "increased diagnostic capabilities of hardware of all types," he said. There should be more schools and seminars informing users about the various communications facilities and characteristics, he added.

Alan G. Melkerson, midwest regional manager of Penril Data Communications, agreed there is a need for more diagnostics in equipment to help stop the finger-pointing between the user and various suppliers.

Bob Smith, sales manager for OEM products, Paradyne, said manufacturers should put more of the communications controlling functions out of the realm of the CPU and put in a "smart box," which would "relieve the user from having DP do functions which can and should be done outside," he said.

Many users currently depend on DP for error control integrity and statistical control, whereas these functions should be performed by a piece of communications gear, he said.

Adapso Management Meeting Focuses on Profitability

NEW ORLEANS – "An Environment of Profit – Now and Tomorrow" is the theme of the 38th annual Adapso Management Conference which will be held here June 21-22 at the Royal Sonesta Hotel.

General sessions and workshops will cover topics ranging from network information systems and data communications to the latest techniques in programming for data centers. The question of "Leasing versus Purchasing" will also be covered.

Concurrent Adapso/Software Industry Association sessions will feature discussions on the future of software, the organization of a software company and important issues facing the industry.

For further information contact Adapso, 551 Fifth Ave., New York, N.Y. 10017.

Genesis One Aims at System/3 Peripherals Market

By E. Drake Lundell Jr.
Of the CW Staff

Wanted: Firm manufacturing electromechanical peripherals for System/3 that needs national end-user marketing. Also looking for similar terminal makers.

NEW YORK – That ad or anything similar has never appeared anywhere and most likely will not. But it expresses the program underway at Genesis One here fairly succinctly: The national marketing organization is actively seeking new companies to represent and is particularly interested in the System/3 peripherals area and in the terminal business.

Myron Angier, president of the firm, noted that the more than 15,000 S/3 users have very few sources for peripheral equipment and therefore are unable to obtain the savings often possible through the use of independently manufactured peripherals.

Company Profile

He said one of the major reasons holding back development in this area is the fact that there are not really that many engineers around capable of developing the low-end electromechanical peripheral equipment.

"Ninety-eight percent of the engineers in the business are working solely on electronic equipment. What we're looking for is a firm made up of the other 2% of the engineers in the business."

He noted it would be difficult for a smaller engineering-oriented firm to market "small ticket" items like peripherals for S/3s and to finance them over as long a lease period as would be necessary.

But, Angier noted, if a firm had the marketing arm it could probably get the lease financing in today's money market. And, needless to say that is where Genesis One could come in, he said.

The firm already has a national sales force and sells equipment made by several different manufacturers, so it could handle lower-ticket items because the selling cost of each item would be spread out across the entire line of equipment the salesman is handling.

In addition, turning to an independent organization for marketing would prevent a lot of headaches for the small manufacturer, he said, and would allow him to reach the market faster than would be possible if he had to set up an organization from scratch.

Easier Than 360s?

"Penetrating the System/3 market," Angier predicted, "will be at least as easy, if not easier than penetrating the 360 market."

This is because the S/3 is basically a less sophisticated system and so the users should not have to worry as much about the possibility of degrading performance if foreign equipment is added.

In addition, a great deal of the S/3 equipment market would be in off-line peripherals, such as card equipment, he noted.

The marketing would have to be completely on a replacement basis, he noted, meaning IBM would install a complete system and the user would gain some experience with it before thinking about turning to outside sources.

Genesis One has been actively looking for firms that are established in the area, he said, but have not found any as yet. However, he noted, there is a possibility that Japanese firms or other foreign producers might have this capability.

In addition, Angier said, the firm is looking at other large growth areas in the computer business in hopes of finding firms that want national end-user marketing and he noted the area of communications terminals, particularly intelligent terminals.

Basically, Genesis One is looking for firms that have proven they can manufacture a product and which probably have sold products in the OEM market for a while, but which are now eyeing the more lucrative end-user market.

Foreign Orders & Installations

The Banque de Paris et des Pays-Bas, S.A., Switzerland, has ordered a Model 6030 system from Honeywell, for operation of private accounts and traditional banking applications.

Nomura Securities Co. Ltd., Japan, has ordered a Univac 1110 to be used as the center of an integrated information complex.

The Caisse Regionale de Credit Agricole Mutuel, a bank in Puy-de-Dome, France, has ordered a Honeywell Series 6000.

The First National City Bank has ordered 100 NCR 399 computers for installation in 22 countries, including Lebanon, Malaysia and Ecuador. The systems will be used to automate the back-office processing of demand-deposit accounts.

The National Iranian Oil Company is installing twin Westinghouse 2500 computers on the Ahwaz-Rey Second Crude Oil pipeline, for use in a supervisory control system.

The French Postal Ministry has ordered a second Postal Address Reader-Indexer System (Paris) from Recognition Equipment France, S.A.

Three Japanese banks, the Osaka Bank of Osaka, the Kyoto Chuo Credit Bank of Kyoto and the Oji Credit Bank of Tokyo, have ordered a total of seven NCR Century 300 systems to monitor installment loans and deposits and to process accounts.

Keio University in Tokyo, Japan, has ordered a Univac 1106 computer system for use in research programs, administration and computer science courses.

Fiducia GmbH, a German data processing center serving a conglomerate of banks, has ordered nine Pertec 3700 computer-output-microfilm systems from Agfa-Gevaert, Pertec Corp.'s European representative.

The National Institute for Nuclear and Particles Physics at the University of Paris has ordered two Cyber 70 Model 72 systems from Control Data Corp. The systems will aid in processing data gathered from scanning devices which photograph vapor paths in bubble chambers.

Zenkyoren, a Japanese concern which handles insurance for agricultural communities, has installed a Univac 1110 system for use in processing policies and statistical work.

The Central Computer Agency in the United Kingdom has ordered a Univac 1106 system to be used by the central statistical office for economic forecasting and research.

Semiconductor Memories May Increase Market Share

By Molly Upton

Of the CW Staff

NEW YORK – The U.S. independent memory market is expected to grow from $445 million in 1972 to $598 million in 1976, and the seminconductor portion of this market will jump from $55 million to $148 million, Dr. Thomas A. Longo of Fairchild Semiconductor Components Group told a recent meeting of analysts here.

The trend towards more memory in computer systems is evidenced by the 10% to 15% annual growth rate in the industry, while the memory segment is achieving a 15% to 25% increase, he said.

The use of semiconductors is "increasing much more rapidly because they are displacing other forms of memory such as core," he observed.

The disk/drum segment of the market will continue to grow, he said, from $240 million in 1972 to $370 million in 1976. The core sector, however, will decline to almost half, from $150 million in 1972 to $80 million in 1976, he predicted.

By 1976, Longo said he expects the total number of bits of information installed in computer systems will be four times greater than today, with both main memory and mass storage growing at nearly the same rate.

"In main memory, cores are expected to double in volume, while semiconductors are expected to increase by a factor of 10," he said.

"From an industry-wide standpoint, in 1972 there were some six billion bits of U.S. non-captive (non-IBM) semiconductor memory installed in computer systems," he continued.

"In the next few years – probably by 1976 – this is expected to climb to 50 billion bits of memory each year. And depending on our progress in penetrating the main memory areas, by 1980 it could be well over 100 billion bits installed annually," Longo said.

With this increase in volume will come a substantial reduction in price per bit. Although he said forcasting prices in such a volatile industry is difficult, he projected prices for MOS memory to average about 0.2 cent/bit during 1976.

Current prices, he said, are around 0.3 cent/bit in volume, whereas in 1972, the average was about 0.6 cent/bit, he said.

In the bipolar area, he sees prices going from 3 cent/bit today to 0.5 cent/bit in 1976. "This is about equal to the MOS prices of late 1972 so the superior performance of bipolar, competing with MOS price advantages will remain a factor in customers' decisions, he added.

In the battlefield of the main memory market, Longo said he expects solid state technologies beginning to take over by 1975-76, with competition between the semiconductor technologies. He said he sees the battle as a "cost versus performance struggle between N-channel MOS and bipolar."

Mass storage memory, such as disks, film and magnetic techniques, offers an "untapped area of potential," he noted.

Many firms in the industry are working on new device technologies that will bridge the performance and cost gap, now held by virtual memory, between the main memory system and mass storage areas, Longo said.

Development of the magnetic bubble, and other techniques could have "significant impact" in disk and other storage areas, he said.

Over the next four years, Longo sees the marketplace breaking down relatively evenly between bipolar and MOS. In 1972, the marketshare held by semiconductor random-access memories (RAM) and read-only memories (ROM) was $55 million, of which $33 million was in MOS, $22 million in bipolar.

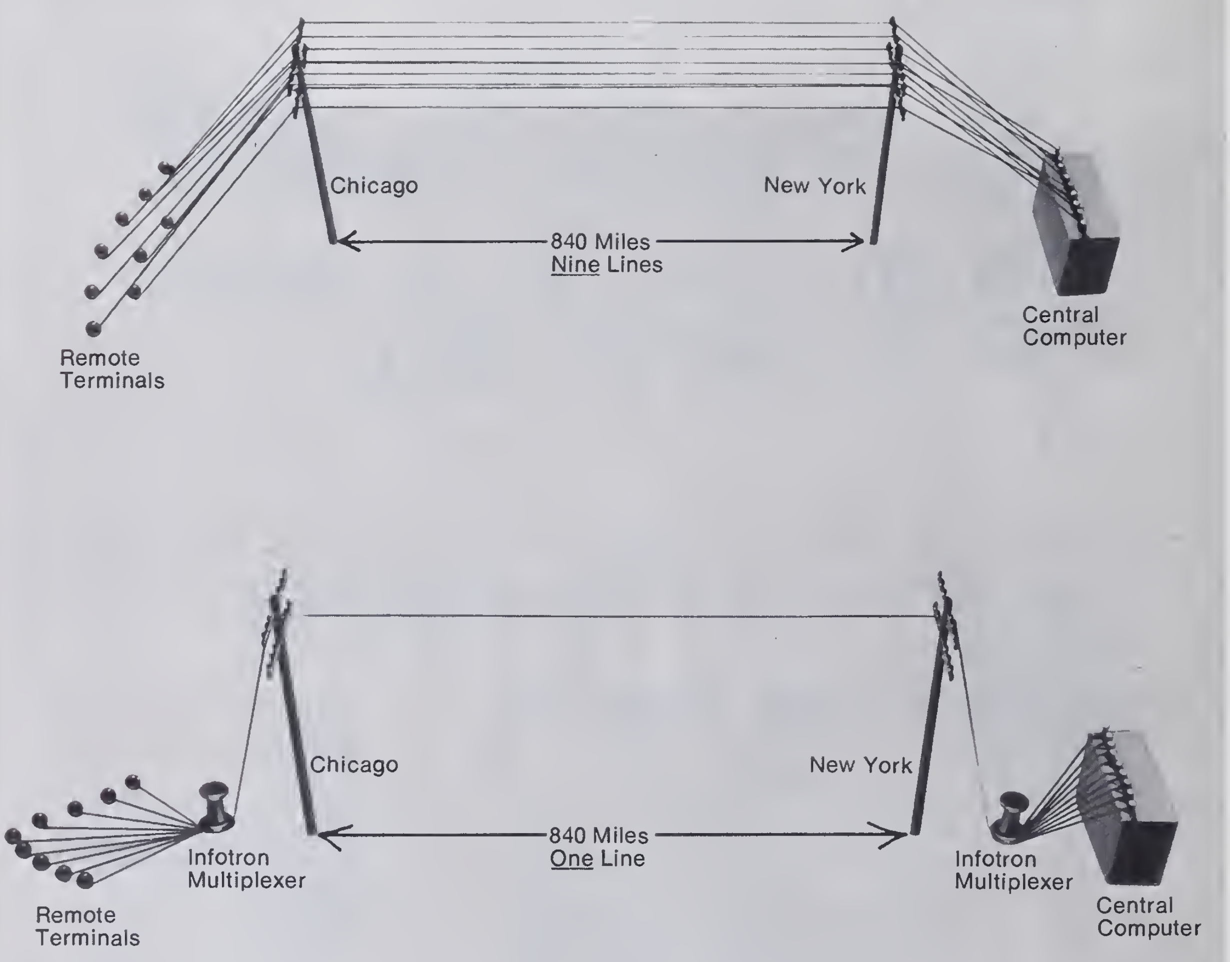
By 1976, he said, MOS sales should rise to $78 million, with bipolar in the $70 million range.

Fairchild Buys Cogar Plant To Expand MOS Facilities

MOUNTAIN VIEW, Calif. – Fairchild Camera and Instrument Corp. has signed a contract to purchase the Wappingers Falls plant which housed semiconductor operations of Cogar Corp.

The facility will be used to expand manufacturing capacity for metal oxide semiconductor (MOS) integrated circuits.

Fairchild also plans to expand its MOS capacity here.



Road to Dominance – Part I

IBM Papers Project 360 Market Share

This series on market penetration by the IBM 360 series examines analyses made by IBM of the market from 1967 through 1969. Part II on Page 36 looks at the reduction suffered by IBM competitors by 1969. Part III, on Page 37, examines the share achieved by IBM in each sector of the systems market.

By Alan Taylor

Special to Computerworld

The competition against IBM's System/360 during the last years of its marketing life diminished fast, dropping from 36% of the average market to under 20% in the two years before 1970, according to newly available IBM documents released in the Greyhound-IBM suit.

Moreover, the hold over any particular market segment by any of the competitors was unstable, and indicated the IBM umbrella, while possibly acceptable for the competition taken as a whole, was not able to help the fortunes of competitors individually.

To establish a solid base, we must look back to 1967 and survey the markets as seen from White Plains then. IBM did its competitive analysis in seven marketing areas labeled A for the large Model 90 through F for the small Model 20 market (See Figure 1).

At the end of 1967 only in the hardwired Model 75 system area, which had always been an oddity of the 360 range and which had been kept over from non-microprogrammed processor times, was combined competition able to sell more equipment in a marketing range than IBM.

Firm	Range	1966/7 Share
Burroughs	A (360/90s, 195s) D (360/50s) E (360/40s)	100% 8% 10%
Control Data	B (360/75s,85s) C (360/65s67s)	31% 12%
General Electric	C (360 65s,67s)	5%
Honeywell	E (360/40s) F (360/25s,30s) G (360/20s, System 3s)	4% 10% 12%
RCA	E (360/40s) F (360/25s, 30s)	10% 4%
Univac	B (360/75s,85s) C (360/65s,67s) G (360/20s, System 3s)	30% 17% 22%

Figure 2. The IBM 1967 figures show competition with more than 4% of any of the marketplaces of the System 360 in 14 cases. These set the scene for the story of 1968/69 competitive activity.

The success stories were in the lower, less powerful systems. A solid block of these existed.

The average market penetration in the area from the smallest 360/20, to the large time-sharing virtual 360/67s was over 70%. Here they were outselling all competition by 2-1, with the fabulously successful Model 50s pulling 88% of the orders in that area.

Analysis

The documents show some confusion and much variation in the competitive situation.

14 Competitors

Even so, there were 14 different cases shown where a specific competitive firm held more than 4% of one of the IBM defined markets (Figure 2).

Undoubtedly, these segments could be used to show that competition was able to grow under IBM's umbrella and possibly disprove the Justice Department's charge that IBM was somehow monopolizing the market. This was in spite of IBM figures showing over 70% IBM occupation of the U.S. Model 20 through 67 markets.

The picture in 1967 was in many ways just one-dimensional. The fortunes of IBM and its competitors were shown only at one point in time.

Events Reveal

Luckily, IBM figures allow us to see what happened to the IBM 20 through 67 70%-penetration block, and what happened to the 14 competitive markets during the next two years.

Theoretically, the idea of system generations should have caused the IBM penetration (as measured by system orders) to decrease during this period, as the new System 370s were about to replace the 360s.

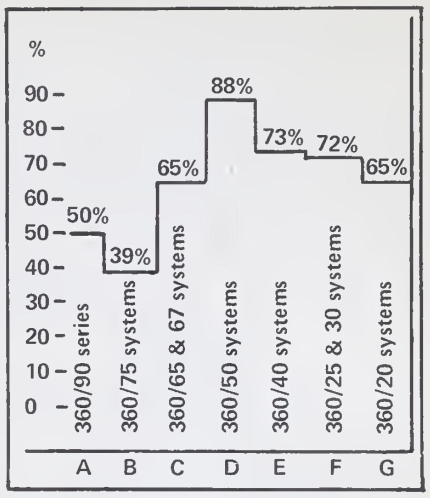


Figure 1. IBM Position in U.S. Computer Markets Before Justice Sued (1966/67). (Source: IBM's Commercial Analysis, Feb. 9, 1970)

What actually appeared to happen, however, was very different for both competition and IBM itself. On page 36, we paint the picture of competition and of IBM itself as the 360 marketing life was closing down.

Australian Post Office Seeks Bids for Network

Special to Computerworld

CANBERRA, Australia – The Australian Post Office (APO) has released a hardware-software RFP for a national computing network based on Sydney and Melbourne as two main processing centers.

Smaller satellite centers in Melbourne, Sydney, Brisbane, Adelaide, Perth and Hobart will be linked by high speed communication lines. The proposal is expected to be worth over $28.5 million.

The bids close June 6 with completion of benchmarks by July 7. Main characteristics of the network are: on-line data entry; direct access storage; and modular programming with a common framework. Hub of the network will be four large systems, two in Sydney and two in Melbourne. These systems will contain approximately 1M bytes of main memory.

The Road to Dominance - Part II

IBM Papers Reveal Changes in Market Penetration by 360s Between '67, '69

By Alan Taylor

Special to Computerworld

Firm	Range	1966/7 Share	1968/9 Share
Burroughs	A (360/90s, 195s)	100%	-23% Share; Wiped out
	D (360/50s)	8%	5% Share; 37% off
	E (360/40s)	10%	8% Share; 20% off
Average Corporation Position; 52% of 1967 Market Share Gone			
Control Data	B (360/75s, 85s)	31%	17% Share; 44% off
	C (360/65s, 67s)	12%	7% Share; 58% off
Average Corporation Position; 51% of 1967 Market Share Gone			
General Electric	C (360/65s, 67s)	5%	2% Share; 60% off
Average Corporation Position; 60% of 1967 Market Share Gone			
Honeywell	E (360/40s)	4%	5% Share; 25% up
	F (360/25s, 30s)	10%	6% Share; 40% off
	G (360/20s, System 3s)	12%	3% Share; 75% off
Average Corporation Position; 30% of 1967 Market Share Gone			
RCA	E (360/40s)	10%	7% Share; 30% off
	F (360/25s, 30s)	4%	2% Share; 50% off
Average Corporation Position; 40% of Market Share Gone			
Univac	B (360/75s, 85s)	30%	27% Share; 10% off
	C (360/65s, 67s)	17%	7% Share; 60% off
	G (360/20s, System 3s)	22%	6% Share; 70% off
Average Corporation Position; 47% of Market Share Gone			

Figure 1. The significant (4% or above) market shares held by IBM competitors in 1967 are compared with the equivalent holdings for the same companies in the same marketplaces for the following two years.

During 1968/69 the IBM White Plains commercial analysis watch on the 360-competitive marketplace showed some drastic changes compared with 1966/67, particularly at the top and bottom market ranges where competition appeared to have had its strongest hold.

For the top end, the two-year averages ended 1968/69 when compared with the two year averages ended 1966/67, showed IBM had totally captured the suddenly booming super-scale computer market with net orders of 18 Model 360/195s.

This moved IBM's figure from 50% to 100% of the net orders. The two competitors in the marketplace, Burroughs and Control Data, suffered from cancellations of the orders given in 1966/67 for systems making them ineffective in the one area where they appeared to be strongest.

At the low end the introduction and success of the IBM System/3 had boosted the IBM share of the market from 65% to 87%. IBM, a year after the filing of the Justice suit, was now out-selling the combined competition by 7-1 in a marketplace that had also apparently been a secure haven for Honeywell (down by 75%) and Univac (down by 77%).

IBM gains had also been scored in the Model 65 area (increasing its percentage from 64% to over 80%); in the Models 25/30 area (72% to 75%); and in the Model 40 area (73% to 75%).

Even where IBM had suffered a total disaster as it had with the Model 85 – which had not gained a single order in 1969 – the IBM percentage had still increased from 39% to 51%. Nowhere had there been even a slight IBM decline in any System 360 market!

The strong 1966/67 Burroughs showing in the Model 25 through Model 50 marketplaces peaking at 15% against the Model 40 marketplace was vanishing. Although the Model 40 marketplace was expanding 10% a year, the Burroughs sales of the B3500 were coming down. The 1967 peak of 134 Burroughs orders had been reduced to a 1969 figure of only 69 – nearly cut in half.

Analysis

Similarly in the Model 25/30 marketplace, the Burroughs orders, which in '67 had peaked at 165 systems, had by 1969 been cut to only 59 systems.

Nor was the picture much brighter for Burroughs in the Model 50 marketplace.

Their penetration had decreased by 37%.

This was discouraging for as a new system, the Burroughs B6500 had been announced some years after the competing 360/50. Clearly, if a six-year-old Model 50 could outsell the B6500, a new IBM announcement could be expected to wipe it out.

Honeywell Orders Halved

Honeywell, the only other non-IBM manufacturer to have apparently achieved a "protected" market (through having sizable entries in three contiguous markets) was also having its problems.

White Plains figures indicated a much faster Honeywell sales drop was occurring than in the equivalent IBM series. By 1969 the Honeywell 200 netted only 50 systems, down by 190 from the '66 peak of 240.

True, these orders were being augmented by the newer Honeywell 125 (similar to the IBM 360/25 augmentation of the 360/30). Even so, this was only taking 36 systems in 1969. Some dwindling support was also available from the Honeywell 1200, now down to 23 from its 1967 figure of 82 orders.

In all, the 1969 figures for the marketplace showed the Honeywell market opposite the 360/25/30s with only 110 net orders, about half its 1967 figures of 201.

The Model 20 type marketplace was one of the two great expansion marketplaces of 1969. It had now tripled in size to 6,000, from the 1967 figures of a net of 1,833 systems.

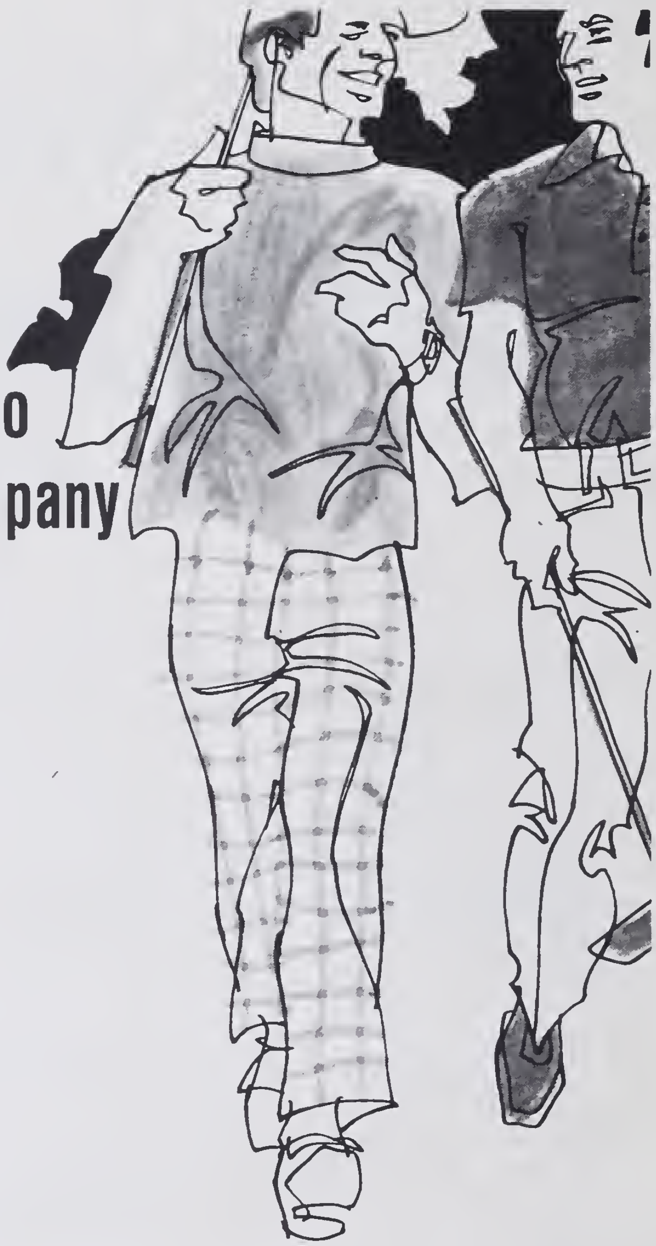
Honeywell's proportion, however, had not tripled. In fact Honeywell had not even maintained its '67 sales rate, dropping from 275 systems in 1967 to 143 in 1969.

Univac Replaces CDC

In fact the *only* market opposite the System 360, which now looked to be open, was the "B Market" – the 360/75 and 85 market. Here the Univac 1108, Model 2, had sold 18 systems in the past year, abruptly taking over market leadership from the CDC 6600, which was down to only 3 systems in 1969, from 14 in 1968.

The IBM Models 75 and 85 gained 11 orders during 1969, and over the two

(Continued on Page 37)



Road to Dominance — Part III

IBM Moves to 80% Market Penetration

By Alan Taylor

Special to Computerworld

Analysis

During the last years of the marketing life of the System 360, IBM's position was analyzed by their own competitive analysts as a part of the competitive process. These figures have now been studied and the results are shown in Figure 2.

This shows the penetration IBM had made in each of the marketplaces in 1967, and by the end of 1969, and the percentage change involved during 1968 and 1969.

Market	1966/7 Share	1968/9 Share	Comparison With 81% "Almost Complete Domination" Level
A (360/195s, 90s)	50%	100%	Domination Achieved 1969
B (360/75s, 85s)	39%	56%	ACD still two more years off, if this trend continues
C (360/65s, 67s)	65%	82%	Domination apparently achieved, 1969
D (360/50s)	88%	89%	Domination retained
E (360/40s)	73%	77%	ACD just four percentage points off
F (360/25s, 30s)	72%	74%	Moving up slowly
G (360/20s System/3s)	65%	87%	Domination Apparently Achieved in 1969
All 360 Market Average	64.5%	81%	"Almost Complete Domination" Achieved in 1969

Figure 2. IBM Market Shares held in 1967 are compared with equivalent shares in 1969.

Going down this market-by-market summary it can be seen that in only one of the seven markets – Market D – was IBM at the 80% level in 1967.

By contrast at the end of 1969, when the 360 was about to be replaced, it had achieved (and indeed over-shot) the 80% market level in three more markets, making a total of four markets – A, C, D and G – where it now held this powerful position.

The total average penetration was also up, according to the IBM figures. While in 1967 the average over the whole marketplace including the 370/75 and up was 64.5%, the new advances had driven market penetration up to a position over 80%.

In fact, as shown by the IBM figures, as the 370 was being prepared for market, IBM was still receiving 81% of the new orders for System 360 markets.

This 81%, which turned out to be the average IBM-recorded penetration right across the 360-board, was mentioned in another part of the same documents containing the IBM figures.

It was defined, fairly explicitly, as being ALMOST COMPLETE DOMINATION – an item that may interest many people who have tried to define this term for years.

This definition occurs in conjunction with the activities of one of the smaller U.S. computer manufacturers, Digital Equipment Corp.

While noting that the competition (offering 44 different computers from a score of manufacturers) had racked up 470 sales against the IBM 1130, the analyst, J.S. Cassidy commented that "DEC continued its almost complete domination of competitive activity in this category. Over 81% of competitions' net orders for the year come from this company's systems."

So – it looks as though IBM had moved forward to "almost complete domination" of the 360 marketplace by the end of the 360 market life, despite the Department of Justice's and the other antitrust suits.

Market Shares Change

(Continued from Page 36)

year period were solidly in the lead.

Again, this replacement of Control Data by Univac, and the fortunes of Burroughs and Honeywell demonstrated the lack of stability of any manufacturer within any 360 market.

The IBM-created 1969 figures indicated an increasing trend of IBM success in penetrating the total marketplace opposite its 360 line from the System/3 through the giant 360/195.

Still, even though by 1969 IBM had increased its share from the 65% average of 1967 – was this in itself justification for the Justice Department suit?

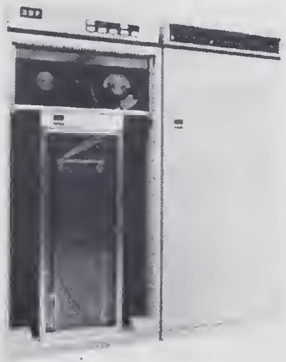
Mere bigness is not necessarily an evil, according to the law. Nor is growth. What is important is the question of *domination.*

Pertec Names Poppa President

LOS ANGELES – Ryal R. Poppa has been named president and chief executive officer of Pertec Corp. He succeeds Harold A. Kurth, who resigned last December as part of a settlement of a proxy fight waged by dissident shareholders.

Executive Corner

- Joseph J. Ciasullo has been named vice-president and controller of Sperry Univac.
- Joseph D. Koenig has been named a vice-president of Diablo Systems, Inc.



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Corporate Telecommunications Staff position to plan and control data transmission applications. Technical knowledge of terminal and modem operation essential. Engineering degree and experience in Data systems analysis and planning desirable.

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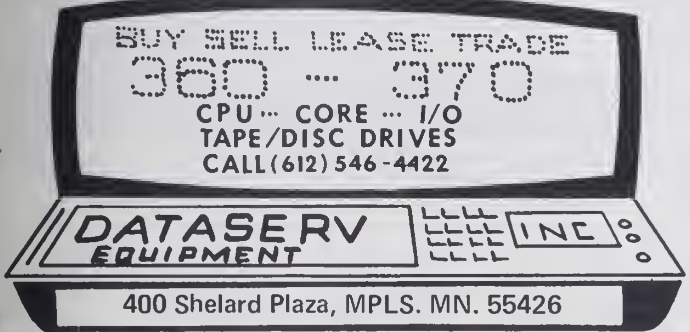
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Central Tokyo, Japan

Honeywell Quarter Earnings Soar 50%, HIS Performance Strong, Analysts Told

By Ken Shonk
Of the CW Staff

WALTHAM, Mass. – Honeywell's executive officers displayed a strong sense of satisfaction with the company's first quarter earnings report at a recent meeting of analysts here. All divisions improved their positions, reported President Stephen F. Keating.

The information systems side of Honeywell enjoyed a stronger first quarter than expected and Keating said indicators for the remainder of the year are strong.

However, he cautioned, "Don't expect earnings to increase in the remaining quarters of the year over a year previous at the same rate earnings improved this first quarter of '73."

Clancy Spangle, executive vice-president and chief of Information Systems, stated he expects a strong year for Honeywell.

"Acceptance of the Model 6000 has turned into a flood of orders," he said, "and the 2000 Series has experienced strong ordering. The value of the 50 and 100 Series systems was also greater than that of any previous year, and the company turned a profit in the minicomputer sector."

First quarter earnings for Honeywell, Inc. were up 50% to $16.9 million from $11.2 million in the year-ago period.

"We think we're in a fairly strong position to take advantage of the upturn in the demand for computer systems and services," he said.

Outlook for 1973

The outlook in '73 points toward a better year than '72 according to Spangle. "Revenues should increase 12% to 15% for the year with the growth rate in the U.S. running 10% to 12% and 15% to 18% outside the U.S. with all of Europe except Italy showing high growth rates."

The large number of Wimmex contract billings contributed to the strong first quarter, officials said. During the quarter 19 of 33 contracted systems were shipped.

Interest income was up 40%, company officials disclosed. Also, the yield of the 2000 Series systems hit its target of 18% to 20%, and the yield of the 6000 Series was much higher than expected since fewer 600s were returned than anticipated and most 400s and 600s were reshipped, they said.

"We're just coming out of a period of product line integration, and we're spending $110 million on R&D.

"Our present R&D approach," noted Spangle, "is that all new designs should be applicable to as wide a use as possible, and that we'll come out with a new line when it is necessary to hold existing customers."

The breakdown on R&D budget expenditures at present is 35% for software, a small amount on advanced research, and the remainder on hardware engineering and development, he said.

Microdata, Interdata Improve Quarter Earnings and Revenues

Two minimakers, Microdata Corp. and Interdata, Inc., both turned in sharply improved performances in recent quarters.

Interdata wound up the record quarter ended March 30 with earnings of $272,500 or 13 cents a share compared with $210,700 or 11 cents a share in the year-ago period.

The 1972 figure includes a $146,800 special credit. In 1973, the special credit amounted to $43,600.

Revenues rose 35% during the period, to $3.8 million from $2.8 million in the year-ago quarter.

The improved earnings resulted from a combination of increased volume and new production efficiencies, according to President Daniel Sinnott.

More at Microdata

At Microdata, revenues rose 54% in the quarter ended Feb. 28, to a total of $2.3 million compared with $1.5 million in the year-ago period.

Earnings, including a $136,000 special credit, reached $283,985 or 17 cents a share compared with $138,704 or 11 cents a share in the 1972 period, when a $71,934 special credit was included.

Performance for the six months also improved, with revenues rising to $4.2 million from almost $2.7 million a year ago, while earnings totaled $522,565 or 35 cents a share compared with $253,524 or 20 cents a share.

Special credits for the periods were $245,000 in 1973 and $124,696 in 1972.

President Donald W. Fuller noted that component scarcity and in some cases poor quality of components delivered, has caused some additional manufacturing costs and delivery schedule problems during the recent period.

Hazeltine Boosts First Period Net

GREENLAWN, N.Y. – Orders for Hazeltine Corp.'s 2000 video display terminal nearly tripled over those of the 1972 first quarter, and shipments almost doubled, the firm reported recently.

Earnings for the quarter ended March 31 rose to $441,000 or 22 cents a share from $134,000 or 7 cents a share in the year-ago period.

Revenues climbed to $17.9 million from $11.6 million in the same 1972 quarter.

The company effected a 50% increase in first quarter marketing, engineering and related expenditures to support the continued growth of its Industrial Products Division, which makes terminals, automatic editing equipment and color film analyzers.

Shipments Rise 20%

The division's shipments for sale and rental amounted to over $4.4 million, a 20% rise over the 1972 quarter.

The Government Products Division's revenues and earnings increased significantly, the firm said.

Overall backlog rose to $88 million from about $82 million in the year-ago period. The Industrial Products Division's portion of the backlog increased to $11 million from $4 million a year ago and $7.8 million at year's end.

TRADE*QUOTES

Computerworld Stock Trading Summary

All statistics compiled, computed and formatted by TRADE★QUOTES, INC Cambridge, Mass 02139

CLOSING PRICES THURSDAY, MAY 3, 1973

SOFTWARE & EDP SERVICES

EXCH		1973 RANGE (1)	CLOSE MAY 3 1973	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	1 1/2	- 1/8	-7.6
A	APPLIED DATA RES.	3- 4	3	0	0.0
O	APPLIED LOGIC	2- 3	1 3/4	0	0.0
N	AUTOMATIC DATA PROC	65- 94	74 5/8	+7 1/4	+10.7
O	BRANDON APPLIED SYST	1- 1	5/8	0	0.0
O	COMPUTER DIMENSIONS	2- 5	4 1/2	+1	+28.5
O	COMPUTER DYNAMICS	1- 2	5/8	- 1/4	-28.5
O	COMPUTER NETWORK	2- 5	1 1/2	0	0.0
N	COMPUTER SCIENCES	2- 6	3 1/2	+ 3/4	+27.2
O	COMPUTER TASK GROUP	1- 2	1	0	0.0
O	COMPUTER TECHNOLOGY	2- 3	1 7/8	- 1/8	-6.2
O	COMPUTER USAGE	5- 9	5 3/4	- 1/8	-2.1
O	COMRESS	1- 2	3/8	0	0.0
O	COMSHARE	5- 9	5 1/2	- 1/4	-4.3
N	CORDURA CORP	6- 15	7 3/8	+ 3/8	+5.3
O	DATATAB	3- 4	2 1/4	- 1/4	-10.0
O	EDP RESOURCES	1- 3	1 1/4	0	0.0
A	ELECT COMP PROG	1- 2	1 1/4	0	0.0
N	ELECTRONIC DATA SYS.	35- 56	37 1/4	+ 1/2	+1.3
O	INFORMATICS	3- 6	2 5/8	- 1/2	-16.0
O	I.O.A. DATA CORP	1- 1	3/4	0	0.0
O	KEANE ASSOCIATES	3- 4	3	0	0.0
O	KEYDATA CORP	7- 12	6 7/8	- 5/8	-8.3
O	LOGICON	4- 7	4 5/8	- 1/8	-2.6
A	MANAGEMENT DATA	2- 5	2	- 1/8	-5.8
O	NATIONAL CSS INC	8- 41	26	+1 1/4	+5.0
O	NATIONAL INFO SRVCS	1- 2	1 1/8	0	0.0
P	ON LINE SYSTEMS INC	13- 17	12 3/4	- 1/8	-0.9
N	PLANNING RESEARCH	3- 7	3 3/4	0	0.0
O	PROGRAMMING METHODS	22- 24	22	+ 1/4	+1.1
O	PROGRAMMING & SYS	1- 1	7/8	0	0.0
O	RAPIDATA INC	13- 24	13	- 3/4	-5.4
O	SCIENTIFIC COMPUTERS	1- 2	1	- 1/8	-11.1
O	SIMPLICITY COMPUTER	2- 4	3 1/8	+ 7/8	+38.8
O	TBS COMPUTER CENTERS	3- 4	2 7/8	- 1/8	-4.1
O	TCC INC	1- 1	1/2	0	0.0
O	TYMSHARE INC	7- 12	7	- 1/8	-1.7
O	UNITED DATA CENTER	5- 6	4 1/2	+ 1/4	+5.8
N	UNIVERSITY COMPUTING	6- 11	6 7/8	- 5/8	-8.3
A	URS SYSTEMS	4- 8	4 5/8	+ 3/8	+8.8

PERIPHERALS & SUBSYSTEMS

EXCH		1973 RANGE (1)	CLOSE MAY 3 1973	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	16- 34	18 3/8	+2 1/4	+13.9
O	ADVANCED MEMORY SYS	12- 23	13 1/4	- 3/4	-5.3
N	AMPEX CORP	4- 7	4 3/4	- 1/8	-2.5
O	ANDERSON JACOBSON	4- 6	5	- 1/2	-9.0
O	BEEHIVE MEDICAL ELEC	6- 10	8 1/2	0	0.0
A	BOLT.BERANEK & NEW	8- 12	7 3/4	- 1/2	-6.0
N	BUNKER-RAMO	6- 18	13 3/4	-1 3/8	-9.0
A	CALCOMP	9- 13	9 1/2	+ 3/8	+4.1
O	CAMBRIDGE MEMORIES	10- 15	9 1/2	+ 3/8	+4.1
O	CENTRONICS DATA COMP	13- 28	22 1/4	-2	-8.2
O	CODEX CORP	11- 19	11 1/2	+1	+9.5
O	COGNITRONICS	1- 3	2	0	0.0
O	COMPUTER COMMUN.	2- 4	1 3/4	- 1/4	-12.5
A	COMPUTER EQUIPMENT	2- 3	2 1/2	+ 1/4	+11.1
O	COMPUTER MACHINERY	8- 13	8 1/4	+ 1/4	+3.1
O	COMPUTER TRANSCEIVER	2- 6	2	- 1/8	-5.8
A	COMPUTEST	3- 5	4 3/4	0	0.0
N	CONRAC CORP	18- 32	19 1/4	-1 1/8	-5.5
A	DATA PRODUCTS CORP	3- 4	3	0	0.0
O	DATA RECOGNITION	2- 3	1 1/2	0	0.0
O	DATA TECHNOLOGY	2- 5	2 1/2	- 1/4	-9.0
O	DI/AN CONTROLS	2- 4	2 3/8	0	0.0
N	ELECTRONIC M & M	3- 6	4 1/4	+ 3/8	+9.6
O	FABRI-TEK	3- 5	3 1/4	+ 1/2	+18.1
O	GENERAL COMPUTER SYS	6- 9	5 1/2	- 1/2	-8.3
N	GENERAL ELECTRIC	59- 76	60 1/8	- 3/4	-1.2
N	HAZELTINE CORP	7- 9	7	+ 1/4	+3.7
O	INFOREX INC	12- 23	15 1/4	+ 1/4	+1.6
O	INFORMATION DISPLAYS	1- 2	1	0	0.0
O	INFORMATION INTL INC	11- 15	11	+ 1/4	+2.3
A	LUNDY ELECTRONICS	4- 9	4 3/4	+ 1/8	+2.7
O	MANAGEMENT ASSIST	1- 1	3/8	0	0.0
A	MILGO ELECTRONICS	17- 28	18 3/4	+ 1/2	+2.7
N	MOHAWK DATA SCI	5- 13	4 3/4	-1 1/8	-19.1
O	ODEC COMPUTER SYST.	3- 6	3 1/4	- 1/4	-7.1
O	OPTICAL SCANNING	2- 7	3 1/2	0-	0.0
O	PERTEC CORP	5- 8	5 1/4	+ 1/4	+5.0
O	PHOTON	3- 7	3 3/4	(SUSPENDED)	
A	POTTER INSTRUMENT	4- 9	5	+ 3/8	+8.1
O	PRECISION INST.	2- 6	3 1/2	+1	+40.0
O	RECOGNITION EQUIP	4- 8	5 1/2	+1 1/4	+29.4
N	SANDERS ASSOCIATES	8- 18	8 1/2	- 1/2	-5.5
O	SCAN DATA	2- 6	2 1/8	- 1/8	-5.5
O	STORAGE TECHNOLOGY	17- 34	19 1/2	+1 1/2	+8.3
O	SYCOR INC	9- 13	11 3/4	- 3/4	-6.0
O	TALLY CORP.	3- 14	3 3/4	-1 1/2	-28.5
N	TEKTRONIX INC	34- 53	35	+1 1/8	+3.3
N	TELEX	4- 6	3 7/8	- 1/8	-3.1
O	WILTEK INC	13- 18	12	0	0.0

SUPPLIES & ACCESSORIES

EXCH		1973 RANGE (1)	CLOSE MAY 3 1973	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	5- 9	7 1/4	0	0.0
A	BARRY WRIGHT	8- 13	8 1/4	+ 1/8	+1.5
A	DATA DOCUMENTS	18- 22	19 1/2	+ 1/8	+0.6
O	DUPLEX PRODUCTS INC	8- 10	7 3/4	0	0.0
N	ENNIS BUS. FORMS	6- 8	5 3/4	0	0.0
O	GRAHAM MAGNETICS	13- 20	12 5/8	- 3/8	-2.8
O	GRAPHIC CONTROLS	10- 12	9 7/8	- 1/8	-1.2
N	3M COMPANY	76- 89	79 3/4	- 3/8	-0.4
O	MOORE CORP LTD	55- 60	57 1/4	-1 7/8	-3.1
N	NASHUA CORP	42- 58	47	+2 1/4	+5.0
O	REYNOLDS & REYNOLD	43- 51	44	- 1/8	-0.2
O	STANDARD REGISTER	16- 20	17 1/2	0	0.0
O	TAB PRODUCTS CO	14- 23	14	0	0.0
N	UARCO	19- 23	18 7/8	- 3/8	-1.9
A	WABASH MAGNETICS	6- 7	6	0	0.0
N	WALLACE BUS FORMS	21- 26	20 3/4	- 1/4	-1.1

COMPUTER SYSTEMS

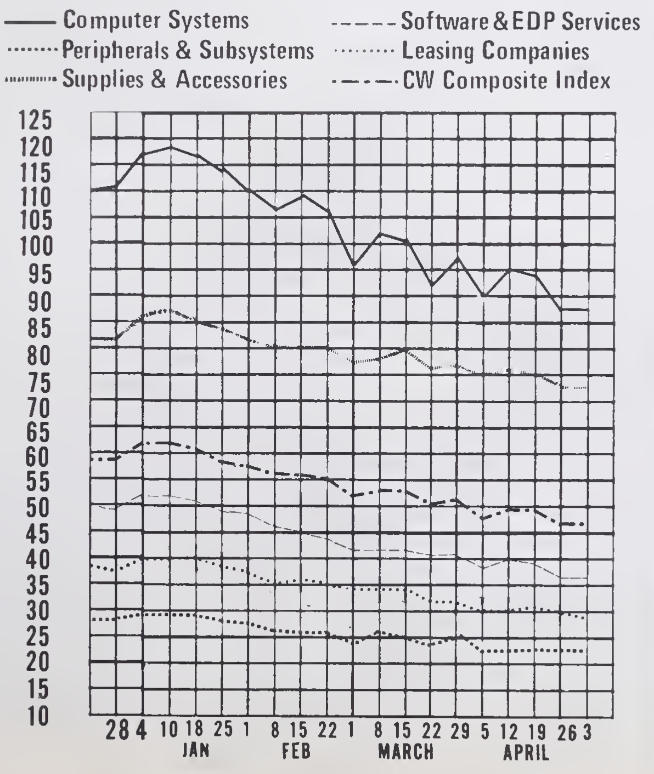
EXCH		1973 RANGE (1)	CLOSE MAY 3 1973	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	215-245	225 7/8	+6 1/4	+2.8
N	COLLINS RADIO	18- 26	18	- 1/2	-2.7
N	CONTROL DATA CORP	42- 62	47 1/2	+1 7/8	+4.1
O	DATA GENERAL CORP	32-131	37 1/2	+3 3/4	+11.1
O	DIGITAL COMP CONTROL	3- 6	2 7/8	- 1/8	-4.1
N	DIGITAL EQUIPMENT	73-105	83	+2 1/4	+2.7
N	ELECTRONIC ASSOC.	5- 9	5 1/4	- 1/8	-2.3
A	ELECTRONIC ENGINEER.	8- 11	7 3/4	0	0.0
N	FOXBORO	24- 32	24	-1 1/8	-4.4
O	GENERAL AUTOMATION	26- 55	31 1/2	+1	+3.2
O	GRI COMPUTER CORP	1- 3	1 1/8	0	0.0
N	HEWLETT-PACKARD CO	77- 95	78	-4 3/8	-5.3
N	HONEYWELL INC	105-139	110 1/2	+ 5/8	+0.5
N	IBM	405-457	424	+14 1/4	+3.4
O	INTERDATA INC	7- 13	10 1/4	0	0.0
N	MEMOREX	6- 19	7	- 1/8	-1.7
O	MICRODATA CORP	6- 10	6 1/8	- 1/4	-3.9
N	NCR	27- 34	34	+1	+3.0
N	RAYTHEON CO	26- 34	27 7/8	+1	+3.7
N	SPERRY RAND	38- 50	40 7/8	+1	+2.5
A	SYSTEMS ENG. LABS	4- 8	3 7/8	- 1/8	-3.1
N	VARIAN ASSOCIATES	13- 20	13 1/8	- 1/4	-1.8
N	WANG LABS.	17- 34	16 7/8	-1 7/8	-10.0
N	XEROX CORP	141-169	152 3/4	+3 3/4	+2.5

LEASING COMPANIES

EXCH		1973 RANGE (1)	CLOSE MAY 3 1973	WEEK NET CHNGE	WEEK PCT CHNGE
A	BOOTHE COMPUTER	2- 5	2 3/8	0	0.0
O	BRESNAHAN COMP.	1- 2	2	+ 1/8	+6.6
O	COMDISCO INC	11- 17	10	+ 7/8	+9.5
O	COMMERCE GROUP CORP	4- 4	3 3/4	0	0.0
O	COMPUTER EXCHANGE	1- 1	3/4	+ 1/8	+20.0
A	COMPUTER INVSTRS GRP	3- 8	3 1/8	- 1/4	-7.4
O	COMP. INSTALLATIONS	2- 2	2	0	0.0
N	DPF INC	6- 9	6 1/2	0	0.0
M	DATRONIC RENTAL	2- 3	2 3/8	0	0.0
A	DCL INC	2- 3	2 1/2	+ 5/8	+33.3
A	DEARBORN-STORM	15- 26	16 3/8	0	0.0
A	DPA. INC.	5- 8	5 1/8	0	0.0
A	GRANITE MGT	3- 6	2 3/4	- 1/4	-8.3
A	GREYHOUND COMPUTER	4- 6	4	- 5/8	-13.5
A	ITEL	6- 12	6 3/8	- 7/8	-12.0
N	LEASCO CORP	9- 18	10 5/8	+ 1/8	+1.1
O	LEASPAC CORP	3- 8	2 3/4	-2 3/4	-50.0
O	LECTRO MGT INC	1- 2	3/4	- 1/8	-14.2
A	ROCKWOOD COMPUTER	2- 3	1 1/2	- 1/4	-14.2
O	SYSTEMS CAPITAL	7- 15	6 3/4	-1 1/4	-15.6
N	U.S. LEASING	24- 36	25	- 1/4	-0.9

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER
P=PHIL-BALT-WASH
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

COMPUTER STOCKS TRADING INDEX



Earnings Reports

TEKTRONIX
Four Months Ended March 3

	1973	1972
Shr Ernd	$.57	$.45
Revenue	59,541,000	49,122,000
Earnings	4,658,000	a3,683,000

a-Includes $835,000 previously treated as special credit.

UNITED DATA CENTERS
Year Ended Dec. 31

	1972	a1971
Shr Ernd	$.35	.....
Revenue	7,799,552	b$6,704,075
Disc Op	.....	446,537
Spec Item	c200,000	d236,145
Earnings	490,974	(1,527,725)

aRestated to reflect operations of Dynafacts, Inc. acquired on Jan. 14, 1972, on a pooling-of-interests basis. b-From continuing operations. c-Credit; tax-loss carryforward credit less writedown of investments. d-Debit; includes costs related to abandoned public offering by acquired company, loss on disposition of data centers and writedown of investments, less tax credit.

DATAMETRICS
Year Ended Oct. 31

	1972	1971
Shr Ernd	$.10	$.19
Revenue	865,253	1,034,706
Earnings	46,946	75,148

ANALYSTS INTERNATIONAL
Six Months Ended Dec. 31

	1972	1971
Shr Ernd	$.09	$.08
Revenue	1,447,500	954,700
Tax Cred	8,000	28,000
Earnings	72,000	68,600

DATA 100
Year Ended Dec. 31

	1972	1971
Shr Loss	a$3.33	b$4.22
Revenue	c13,082,000	3,884,000
Loss	a5,958,000	b5,043,000

a-Reflects cumulative effect of change in accounting principle. b-Reflects retroactive application of change in accounting principle. c-Includes $3.1 million in sales to Randolph Computer Corp.

METRIDATA COMPUTING
Year Ended Dec. 31

	1972	1971
Shr Ernd	$.79	$.62
Revenue	4,336,000	2,735,000
Tax Cred	128,000	104,000
Earnings	296,000	225,000

TUCSON DATA CENTER
Year Ended Oct. 31

	1972	a1971
Shr Ernd	$.25	$.11
Revenue	486,445	470,372
Earnings	33,440	14,339

a-Restated.

MENTOR
Six Months Ended Dec. 31

	1972	1971
Shr Ernd	$.03	$.10
Revenue	2,099,240	995,262
Tax Cred	19,000	37,500
Earnings	39,995	79,004

I.O.A. DATA
Three Months Ended Dec. 31

	1972	1971
Shr Ernd	$.05	$(.01)
Revenue	941,751	821,417
Earnings	41,520	(9,053)

COMTEN
Year Ended Dec. 31

	1972	1971
Shr Ernd	$.11	.....
Revenue	6,482,340	$8,227,601
Tax Cred	108,000	.....
Earnings	219,177	(66,509)

DATATAB
Year Ended Dec. 31

	1972	1971
Shr Ernd	$.21	$.19
Revenue	5,248,519	4,229,490
Earnings	177,083	157,520
3 Mo Shr	.02	.08
Revenue	1,325,247	1,224,618

BRADFORD COMPUTER & SYSTEMS
Three Months Ended March 31

	1973	1972
Shr Ernd	$.18	$.15
Revenue	11,645,908	4,887,622
Tax Cred	9,690	116,820
Earnings	704,024	501,516

COMPUTERVISION
Three Months Ended March 31

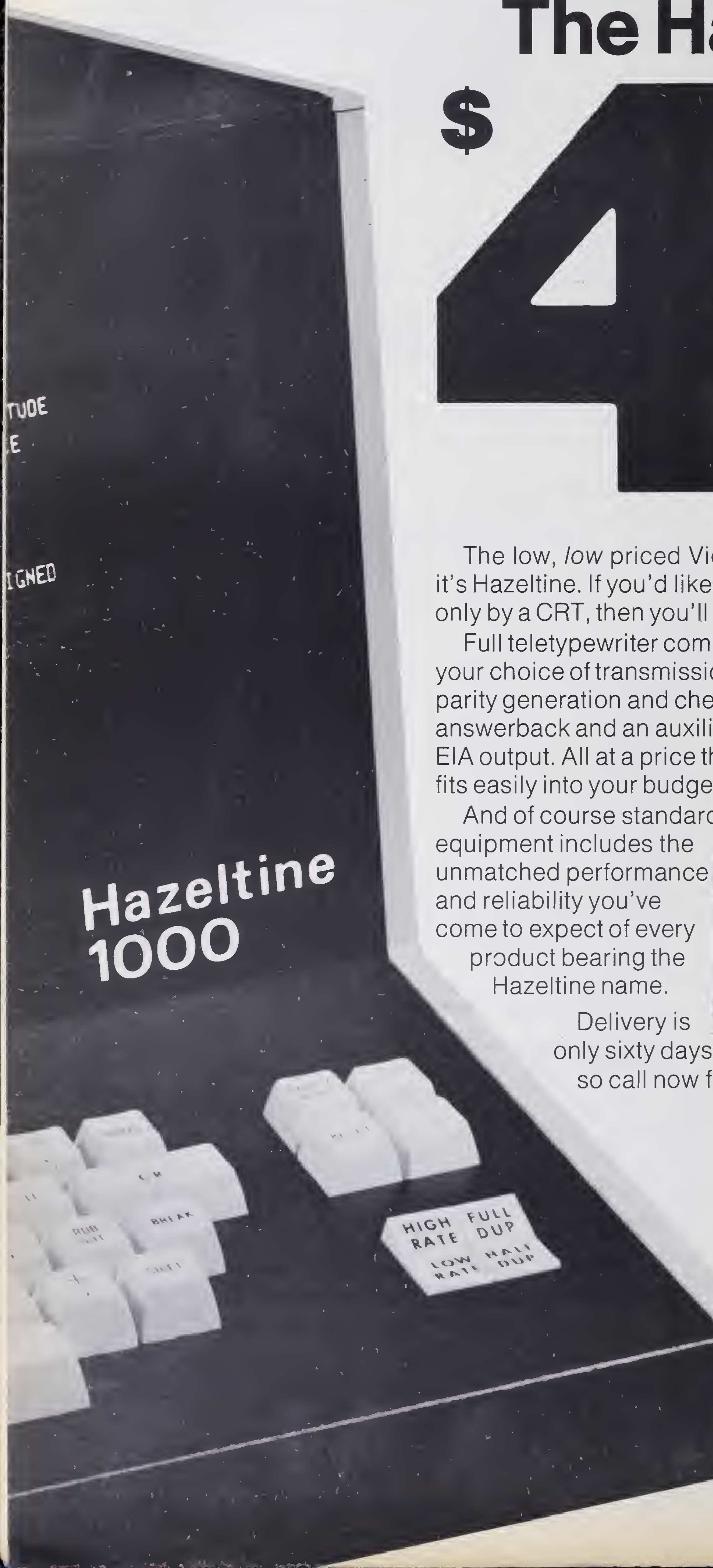
	1973	1972
Shr Ernd	$.14	$.07
Revenue	3,366,000	1,183,000
Tax Cred	.....	51,000
Earnings	303,000	127,000

ECRM
Year Ended Dec. 31

	1972	1971
Shr Ernd	$.59	a$.11
Revenue	5,389,505	1,842,489
Spec Cred	150,300	42,000
Earnings	604,102	100,451

a-Adjusted for eight-for-one stock split in November 1971.

Hazeltine Introduces a New Era in Terminal Economy: Announcing The Hazeltine 1000.



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